The Mining Journal

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In this issue . . .

| Natural Gas Steals a March on British | |
|--|-----|
| Coal | 473 |
| Sierra Leone's Diamond Scheme | 475 |
| America's Barter Programme | 475 |
| Mine Safety | 477 |
| Morocco's Phosphate Industry Expands | 477 |
| High Sinking Rates at N.C.B.'s New | |
| Kellingley Colliery | 478 |
| Preconcentration of Flotation Feeds with | |
| T.B.E | 481 |
| Minerals Exploration in the Ivory Coast | 483 |
| G.E.C. Streamlines Exports | 483 |
| Prospecting in Tanganyika | 483 |
| Mining Miscellany | 484 |
| Machinery and Equipment | 487 |
| Cento Coal Symposium | 489 |
| Two Exhibitions at Earls Court | 489 |
| Metals and Minerals | 491 |
| London Metal and Ore Prices | 493 |
| Mining Finance | 494 |
| Company Meetings | 498 |

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Natural Gas Steals a March on British Coal

HE bogey of natural gas which has so long haunted the North American coal scene is now likely to move into the U.K. and no doubt to other countries. Last week's surprise decision by the Minister of Power giving unqualified approval to the British Gas Council's plan to import Saharan natural gas provoked the Coal Board's chairman, Lord Robens, into announcing, "I am grievously disappointed and considerably surprised that this decision has been made before it is known whether gas could be produced equally cheaply from British coal by the Lurgi process".

Lord Robens will not be the only one to be surprised. It seemed nothing less than common sense to assume that any decision on the Saharan scheme would be conditioned by the report of the Joint Study Group set up by the N.C.B. and the Gas Council to consider the technical and economic aspects of a national Lurgi grid project. As we said in our issue of October 27, 1961, this scheme could give a tremendous boost to the British coal industry at a time when such stimulus is sadly needed. Already £78,000,000 in the red, as a result of operations since 1947, and faced with shrinking markets, the Coal Board seems destined to incur still further losses over the next few years.

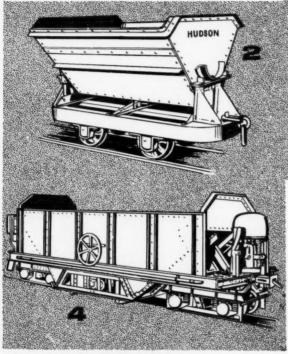
Despite occasional Ministerial assurances that the industry will not be allowed to founder, there has been no concrete evidence, so far, of the emergence of a national fuel policy for Britain. Perhaps this long-awaited policy will subsequently be shaped in the context of an overall European energy pattern if and when Britain joins the Common Market. The decision by the Minister of Power to allow gas imports from French territories may, in fact, have been influenced by the thought of things to come and could be construed as a token gesture to the Community, indicative of a desire to increase trade between Britain and the Six. If this is not the case it seems illogical to refuse to allow the import of cheap Polish and American coal, and yet sanction unrestricted imports of another hydrocarbon fuel because of its cheapness compared with the indigenous product. Certainly the miners employed in the twenty Scottish collieries scheduled for closure next year will find the reasoning behind these decisions somewhat obscure.

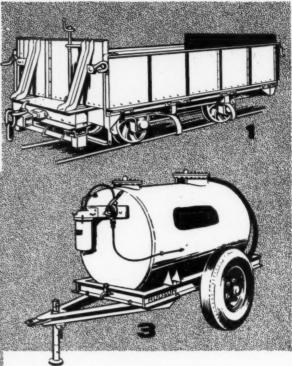
The Gas Council spokesman rather airily dismisses the possible repercussions of the natural gas scheme by stressing that imports will only amount to some 10 per cent of total gas requirements. Admittedly this does not appear to be at first sight a particularly significant proportion, but when it is considered that the gas industry buys some 22,000,000 tons of coal a year, it can be readily calculated that imports of gas, even on this relatively, small scale, represent a possible loss of employment to some 6,000 miners.

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Whatever the facts may be, the fact is inescapable that the market for natural gas is wide open and that there are apparently no serious obstacles to large-scale long-distance transport of this commodity. The 14,000 tons of liquid natural gas successfully carried across the Atlantic between January 1959 and March 1960 pointed the way to the wider application of this fuel at industrial centres geographically remote from its source.

The liquid methane will be stored in tanks to be built by the North Thames Gas Board near their existing tanks at Canvey, which will also be used. It will then be pumped to regasification equipment and after that transmitted through a new pipeline laid for the purpose to at least seven of the 12 area Gas Boards, extending up to the North Western and West Midland Regions. Each Board will be responsible for the section of the pipeline to be laid in its own area, and ultimately it is expected that a trial Lurgi plant situated in the Midlands will also feed into the grid.

The two tankers which will be required to transport the gas will each have a capacity of about 12,000 tons of liquid methane, that is some six times larger than the *Methane Pioneer* used in the initial American trials. Owing to the low specific gravity of the cargo, the dimensions of the tankers will be similar to those of a conventional 28,000 tonner, i.e. 610 ft. length overall and a beam of 80 ft.

Natural gas, however, is not the only competitor to be watched by the coal industry. Another is looming up from the oil companies, particularly American suppliers, who are hoping to negotiate contracts with Gas Boards for the supply of liquified petroleum gas at what are believed to be attractive prices.

There is no argument about the British coal mining industry being able to meet any demand for gas, but it is impossible to justify the protection of a higher cost source of domestic supply unless it can be shown that consequential penal tariffs on imported products will not on balance operate to Britain's disadvantage.

SIERRA LEONE'S DIAMOND SCHEME

After five years the Alluvial Diamond Mining Scheme has settled down into an accepted part of life in Sierra Leone, states the Mines Department in its annual report for 1960. Under this scheme, twenty more Chiefdoms, or parts of Chiefdoms, were declared for mining during the year, bringing the total up to 67 covering an area of approximately 9,000 sq. miles.

Between 16,000 and 35,000 people are employed under the Scheme at any time, making it by far the largest single employer in indigenous mining. Several thousand more employ themselves in providing food and lodgings for the miners. Some £8,800,000 was disbursed between licence holders and their tributors and a substantial part of this was spent on items passing through the Customs, the country thereby obtaining further revenue from the scheme. In August, 1960, a free grant of £50,000 was made from the American Aid Revolving Loan Fund for the purpose of assisting diamond miners by the purchase and resale to them of equipment such as pumps and their spare parts, screening, sacks (for dams), etc., which cannot always be obtained locally.

Strict security measures were continued by the Sierra Leone Police and Sierre Leone Selection Trust Security Force and illicit mining within the company's leases at Yengema and Tongo was at its lowest for many years. Diamond production amounted to 684,540 ct. as compared with 660,404 ct. in 1959. Exports were provisionally valued at nearly £4,500,000.

On the subject of iron ore, the report states that production at Marampa by the Sierra Leone Development Co.,

amounting to 1,446,312 tons, was the highest since production began in 1933. Construction of a new mill was started to raise the yearly capacity from 1,500,000 to 2,000,000 tons. The company has put in hand the planning of further expansion at Marampa by another 1,000,000 t.p.a., which will involve further development of the railway and port at Pepel.

AMERICA'S BARTER PROGRAMME

In recent years barter has not been a major programme in the United States either for the disposal of domestic agricultural surpluses or for the acquisition of metals and minerals. In the fiscal year ending June 30, 1961, barter contracts totalled \$165,200,000, compared with \$158,300,000 in the year ending June 30, 1960. Nevertheless, the barter transactions of the Commodity Credit Corporation remain an important market factor, more especially in the case of such minerals as manganese and chromite, where supply has overtaken demand and where economic and political problems are often interlinked.

Of considerable interest, therefore, to other Free World countries are recommendations for streamlining the U.S. barter programme, as well as more effective use of its stockpiling aspects, which are contained in the report of a Special Advisory Task Force. This report, which is the result of a four months' study by a group of individuals and firms associated with the barter trade, is at present under examination by the Department of Agriculture and other agencies. The objectives are to promote the national defence, domestic economy, and long-range cold war objectives of the U.S.

A major proposal is that, as far as possible, all upgrading of material in the strategic or supplemental stockpiles should be paid for by barter. The Task Force believes that this would save the taxpayer dollars and, in many instances, would also help to reduce federal aid to distressed areas. In order to implement this recommendation, however, new legislation would probably be necessary, since the Commodity Credit Corporation as at present constituted is run like a conventional corporation, with a profit and loss balance sheet, whereas the type of operation proposed might involve giving away agricultural commodities without receiving anything in return.

The Task Force has proposed that the selection of "economic stockpile materials" should be based on the following: Those useful to the U.S. economy in the future, which are not of domestic origin.

Surplus materials that can be removed from world markets without increasing productive capacity. It is felt that by barter for stockpiling, the U.S. Government can relieve temporary oversupply of metals on the world market. This would "bolster world and domestic prices to relieve economic distress in friendly countries and prevent severe drops in domestic market prices, which would cause shutdowns of mines and smelters, some of which cannot be economically reopened."

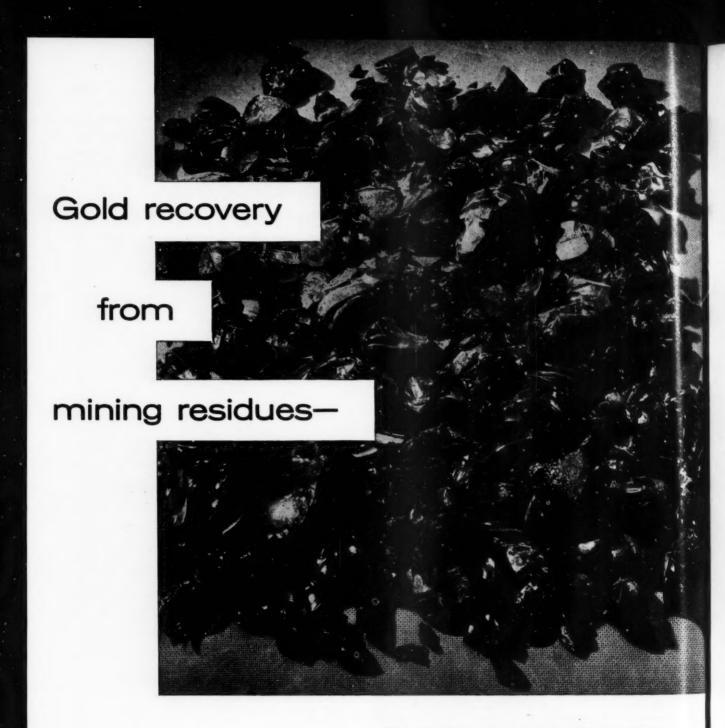
Creation of maintenance of employment in labour surplus areas of the United States by using domestic facilities for processing materials acquired through barter.

Maintenance of the domestic mobilisation base; here again the reasoning is that processing of barter-procured materials would help to keep alive plants producing items essential in time of war, but now operating in labour surplus areas.

The saving of dollars which, otherwise, would be spent abroad in "pre-emptive" purchases of materials.

The assistance of economic development in "backward" countries through trade instead of aid.

Countering the Soviet economic penetration of underdeveloped countries. (continued overleaf)



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The Task Force also recommends that some material procured abroad for the International Co-operation Agency or for military operations should be paid for by barter, and it believes that the barter programme could be used to find outlets for products other than strategic materials in order to expand trade in the Free World.

It further advocates that the complex categories currently determining what kinds of barter deals can be made with particular countries should be reduced to two divisions, "R" and "O". The "R" countries would be those with a good dollar position which have historically purchased a major part of their imports of a particular commodity from the U.S., in which the U.S. is maintaining its export position in that commodity, and in which the commodity is priced competitively. Japan and Western Europe would comprise the primary "R" countries.

Barter commodities would only be exported to "R" nations if the C.C.C. would receive reimbursement from other government agencies for the items acquired and for that part of the value of materials represented by the cost of foreign raw materials, or to effect foreign policy or other government objectives.

In general, the Task Force considers that its recommendations, by simplifying the cumbersome barter procedures, would increase U.S. agricultural exports, help to stem the flow of gold and dollars abroad, and aid both depressed nations and America's own depressed areas. In summarising the proposals, however, American Metal Market points out that many of the streamlining recommendations, even if adopted, would require considerable study and work before they could be implemented.

MINE SAFETY

Two important reports recently published by H.M. Stationery Office are both concerned with one of mining's fundamental problems—mine safety. They view the subject from different standpoints: on the one hand there is the Annual Report of the Safety in Mines Research Establishment (S.M.R.E.) detailing the activities of mining's "back-room boys" in their efforts to make the industry a safer place in which to work; and complementing this, is the Report of H.M. Chief Inspector of Mines which can be considered in part to measure the effect of such research.

The 39th annual report of the S.M.R.E. focuses attention on the strenuous efforts being made to reduce the toll of life and limb in Britain's mines. It is particularly distressing that despite these efforts the Report of H.M. Chief Inspector of Mines for 1960 reveals that there has been little or no reduction in the number of serious mining accidents over the last decade. This lamentable state of affairs is certainly not the fault of S.M.R.E. or associated organizations, for the blame can all too often be laid fairly and squarely at the door of the miner—frequently posthumously.

During 1960, 317 men were killed in British colleries and 1,573 seriously injured. According to H.M. Chief Inspector at least half of these accidents could have been avoided by compliance with the law or the exercise of ordinary care. This reveals a serious weakness in the link between principles and practice. No matter how effectively research is carried on by bodies responsible for improving mine safety, or how diligent those responsible for enforcing it, the man at the face is the one who decides success or failure. Although spectacular mine disasters hit the headlines of the national dailies it is the cumulative effect of many little accidents that is responsible for the greater part of the accident toll.

The year under review, 1960, saw the serious disaster at

Six Bells Colliery in which 45 men were killed. This was a tragic reminder of the danger from coal dust explosions and the potential risks of comparatively small accumulations of firedamp. The S.M.R.E. report reveals that this coal dust explosion was initiated by the ignition of firedamp which had accumulated along no more than a few yards of roadway: the resultant coal dust explosion spread through 3,000 yards of roadway with disastrous results. In an effort to prevent another Six Bells or any one of a score of similar disasters in British mining history S.M.R.E. is building a full-scale explosion galiery at the Buxton station. This will be used to determine the efficacy of stone dust barriers as a preventitive against coal dust explosions. Fully instrumented this 400 yards long gallery will permit a major advance in the study of explosions.

The S.M.R.E. reports deals at length with the studies of the flow of methane and its dilution by air currents. These studies have produced a satisfactorily complete mathematico—physical account of the phenomena which makes it possible to decide whether, in a particular case, methane drainage or increased air velocity is the best remedial measure. Research on the ignition of methane by various means is still going on, and details are given of several instruments designed to reduce the occurrence of ignitions.

Many other aspects of mine safety are considered in the S.M.R.E. report including pneumoconiosis, rescue equipment, mechanical and electrical hazards. One of the important features of such research is the absence of geographical boundaries. Close liaison is maintained between research workers in most of the world's mining fields. It is by such co-ordinated effort, and a determination by the miner to act upon what is learnt, that mining will eventually become a less hazardous occupation than it is to-day.

MOROCCO'S PHOSPHATE INDUSTRY EXPANDS

The Office Chérifien des Phosphates (O.C.P.) has announced in Rabat, Morocco, that it will invest a total of approximately £20,000,000 in developing the phosphate industry which this year is expected to produce over 8,000,000 tons for export. The capital will be invested in a period of four years in a new plant and social services for the employees, according to Mr. Mohamed Laghzaoui, director of the O.C.P.

With the installation of new plant it is hoped that by 1964 the O.C.P. will be able to produce 3,000,000 tons annually of enriched phosphate with a calcium phosphate content of between 85 and 87 per cent, making it "the richest phosphate in the world", according to Mr. Laghzaoui.

At present Moroccan phosphate production breaks down as follows: 2,000,000 tons at 70-72 per cent, from the Youssoufia mines (ex-Louis Gentil), 450,000 tons at 75 per cent, from Khouribga enriched by the German B.A.S.F. process to bring it up to 77-78 per cent, 80,000 tons at 80-82 per cent processed at the Sidi Daoui washery and the remainder 75 per cent grade from Khouribga.

In addition, the industry's potentiality is expected to be increased considerably by means of a process for enriching low-grade rock with a chemical washer than can be recuperated after treating the phosphate. This process, being developed here in collaboration with Messrs. Dorr Oliver, of Stamford, Connecticut, U.S.A., is expected to increase exploitable reserves to "several milliards of tons".

Several American and European firms have also submitted estimates for the construction of a chemical industry in Safi, located east of the Youssoufia mines on the Atlantic coast, where phosphate will be transformed into fertilizer, or super-triple phosphate.

HIGH SINKING RATES AT N.C.B.'s NEW KELLINGLEY

NEW colliery is being sunk at Kellingley in the Castleford Area of the National Coal Board's North Eastern Division. When in full production it will be capable of producing at the rate of 6,000 tons a day, or about 1,500,000 tons of coal a year and will provide employment for about 3,000 men. Reserves amount to 200,000,000 tons, sufficient for a life of about 130 years.

Two shafts, both 24 ft. in dia. are now being sunk to a depth of approximately 850 yd. and for the first 50 years the output will be extracted from the Silkstone and Beeston seams which lie at depths of 2,087 and 2,298 ft. respectively. Boreholes proved the existence of 600 ft. of water-bearing Permian measures to overly the coal measures, the upper limestone being particularly heavily watered.

The use of brine freezing for water control, together with a non-simultaneous method of sinking and shaft lining, entailing a high rate of pouring and an extremely consistent mix are amongst the major features of this high speed shaft sinking which is being carried out by the Thyssen Shaft Sinking Co. Ltd. The freezing process used to seal the shafts against inflows from the strata was carried out by the Foraky Co. Ltd., 37 bores and one centre being employed to each shaft.

Notwithstanding the limitations imposed by the freezing process, high sinking rates were maintained during sinking through the frozen ground and when clear of this handicap, in the unfrozen ground in January 336 ft. were sunk and 345 ft. lined in No. 2 shaft.

The main sinking of No. 1 shaft started on February 26 1960, and No. 2 shaft on June 19 1960. Each shaft is served by two tower-mounted friction winders, and these are being used for the sinking operation. After shaft sinking has been completed the winders will be fitted with closed loop-control.

It is proposed to wind the output at No. 2 (upcast) shaft in 15 ton capacity skips; No. 1(downcast) shaft will be equipped with two three-deck cages and be used for winding men, materials, and dirt.

Freezing Principle

The freezing principle employed at Kellingley consisted of maintaining a continuous sheath of frozen strata around the shafts during sinking, this being effected by circulating the brine through tubed boreholes which extend well into the non-permeable strata to ensure complete sealing of the shaft. The refrigerant is a solution of calcium chloride in water, the freezing point of which is —22°F. at a specific gravity of 1.24. The surface brine mains are 8 in. bore and are lagged with a 2½ in. thick layer of insulating cork. At the refrigeration plant, liquid ammonia is evaporated at low pressure in tubular heat exchangers, the latent heat of evaporation being derived from the brine during its passage through the heat exchanger tubes.

The ammonia gas is taken from the heat exchangers to high speed single stage vee type ammonia compressors, these being 6 cylinder machines driven by 150 H.P. A.E.I. slip ring induction motors. They deliver to banks of condensers which are cylindrical heat exchangers upon which cooling water is played, resulting in liquefaction of the ammonia before passing out through automatic expansion valves and on the brine heat exchangers. Each ammonia circuit is independent, the four circuits being used to give the maximum reliability in maintaining brine circulation. Some 1,200 lb. of ammonia

COLLIERY

is used in each circuit. The brine circulation is some 70,000 g.p.h., maintained by two pumps, the brine containing some 70 tons of calcium chloride.

Rotary drilling for the freezing bores began at the end of March 1958 and was completed in early September 1958, a total of some 49,450 ft. being drilled with the boring completed and the refrigeration plant installed, freezing at the site of No. 1 shaft was started on October 27, 1958, the ice wall being closed at the end of February 1959. Commencing and closing dates for No. 2 shaft were December 15, 1958, and July 9, 1959 respectively, the resulting ice walls formed being some 80 ft. in diameter.

With regard to shaft lining, the need to ensure the highest degree of consistency in the mix and the minimum amount of segregation during pouring is of the greatest importance. At Kellingley, the former condition was met by the use of a Blaw Knox AP100 Gyramixer with delivery of the concrete via a conveyor to Blaw Knox roller gate hoppit and then to an octopus situated between the decks of the shaft stage.

The majority of lining in the frozen ground is of 18 in. thickness, but towards the base of this frozen area, at 460 ft., the thickness of the lining was increased in steps from 18 in. to 24 in., then to 27 in., at this point the frozen ground ended. Below this level the lining was reduced in thickness from 27 in. to 24 in., then to 18 in. and finally to the normal ground lining of 12 in.

Sinking Equipment

The main equipment used for the sinking consists of a two deck stage which is suspended in the shaft by four ropes which also act as guide ropes for the riders of the hoppits. The decks are 30 ft. apart and surmounted by a catwalk 10 ft. above the top deck. The first or upper deck carries four 2-ton worm-driven self-stabilising winches for movement of the shuttering in the shaft. The air and water manifolds are also carried on this deck. Between the decks is located the octopus and chutes for emplacing the concrete lining, the chute trunking being of light gauge steel sections joined by chains to give flexibility in operation. Two columns for air and water services are also fixed between decks, the top manifolds receiving hoses from pipelines temporarily attached to the shaft lining.

Underneath the bottom deck of the sinking stage is situated the mechanical loading equipment. This is compressed air driven and is suspended from an inner and outer monorail. The main hoist motor which operates the 20 cu. ft. Priestman Cactus grab, is also mounted on rails inside the unit, which then allows the grab transverse as well as circumferential movement. The 20 cu. ft. Priestman Cactus grab is of the compressed air, 6-bladed type.

The winders are part of the permanent mine installation. At No. 1 shaft a friction winder is driven by a 1,100 B.H.P. A.E.I. motor whilst at No. 2 shaft the winders are driven by twin 1,100 B.H.P. A.E.I. motors at 11,000 volts. The winder drums were modified during sinking to accommodate single rope winding. The towers are of steel construction and are

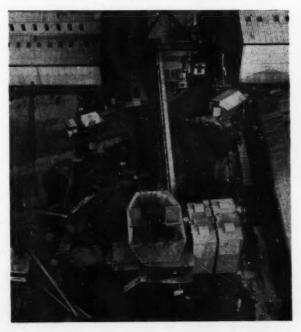
fitted with deflection pulleys in order to bring the winding ropes into the correct position for sinking.

The prime requirement of an extremely high rate of production, coupled with an extremely consistent mix of constant water/cement ratio has been met by the provision of the Blaw Knox AP100 concrete mixing plant which has an output of 100 cu. yds. per hour and can feed to either shaft. Essentially. this plant consists of four sections, the first of which is an eight compartment batching plant which has an aggregate storage capacity of 100 cu. yds. a weighing unit and a control panel. Cement is stored in extendible bulk cement handling units. The main section of the plant are the twin Blaw Knox Gyramixers which have a mixed batch output of 28 cu. ft. A further section consists of two specially fabricated conveyors, constructed by Thyssen Shaft Sinking Co. Ltd., which take the concrete to either shaft and the 2 cu. yd. wet receiving hopper located here to receive the concrete before discharge to the 2 cu. yd. Blaw Knox roller skips used for transport down the shaft. The batching plant comprises three main units, the main bin unit which includes the operating platform and control panel, the supporting structure and aggregate weigher and a flared top section.

The specifications require a minimum strength of 4,500° lb./sq. in. at 28 days in frozen ground, the average figures obtained to date being 7,000 lb./sq. in. In unfrozen ground the specification is for 3,000 lb./sq. in. the average figure reached here being 6,000 lb./sq. in. at 28 days. During the lining in frozen ground, Sulfacrete was employed, Earles Portland cement being used in unfrozen ground.

The sinking routine in frozen ground was dominated by the necessity of ensuring that the freezing tubes were not damaged by excessive shock waves. Thus in this section, a 3 square draw cut, comprising twelve holes, followed by a round of 64 holes was adopted and in order to rationalise the drilling as far as possible, the floor of the shaft was divided up into quadrants and the cut, two machinemen being permanently allocated a section. Thus in the cut, the two most experienced drillers were located, each drilling the full depth of six feet and working on diametrically opposed holes. In the quadrants, the first of the two drillers worked to a depth of 4 ft. 6 in.,

The Blaw Knox AP100 batching plant serving both shafts



continuously, the second machineman being permanently engaged in deepening these holes to 6 ft.

Modification of the drilling machines to allow for high volume blowing of C/A at the tip, in order to cool the bit and remove from the hole any liquid formed before refreezing took place, met with some success. Integral drill steels with cross bits were used throughout the frozen ground, but did not prove ideal for normal ground. Here integral steels with chisel bits produced far better results.

Aspects of Charging

Charging of the boreholes is carried out by N.C.B. deputies assisted by Thyssen personnel. The amount of explosive to be used in any one round in the frozen area was limited to 150 lb. to ensure that excessive shock waves were not set up, which could possibly cause damage to the freezing tubes. The depth of the rounds varied between 6 ft. and 10 ft. according to the strata encountered. This limitation of explosives made it necessary to fire twice for each full round of holes bored, the outer or cropper holes being fired separately from the rest of the round. Parallel mains electrical firing was employed.

To reduce charging time to a minimum, the buss bars are prepared on surface in a priming shed. Non-inflammable, sand-filled, paper bags are used for stemming.

Smoke clearance is effected by a booster fan in the main 30 in. air services column which is carried down as shaft lining proceeds. The stage is raised 150 ft. before firing and the shaft is inspected before it is lowered after firing. With the stage in position, mucking commences, using 4 hoppits. Thus, whilst the grab fills a hoppit on the East side of the shaft, the west winding rope drops an empty hoppit on the west side of the shaft and picks up a full one. When the hoppit on the East side is full the grab swings around and commences loading on the West side. Loading is always arranged underneath the winding rope carrying the full hoppit to the surface.

The temporary support employed in frozen ground consists of steel channel rings, suspended on hooks, with dowels inserted in the ground every 5th ring to provide additional security. Behind the steel rings are placed corrugated steel sheets held against the ground by timber poling boards.

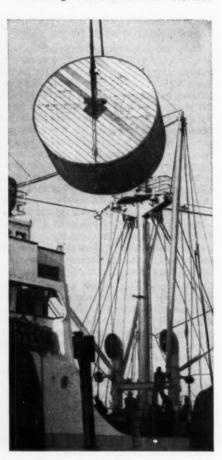
The lining was emplaced in 5 ft. lifts, the shuttering consisting of two 2 ft. 6 in. high rings of ½ in. steel plate used with releasing segments. In frozen ground, provision was made in every 5 ft. lift for 8 injection pipes, with a further 8 being located in the crib ring. The grouting was carried out within 10 days of placing any part of the lining, whilst local thawing of the ice was occurring. For each 40 ft. section, some 20-30 tons of cement were injected, using a Boulder grouter.

The grouting was carried out at a maximum pressure of 60 p.s.i. The mix was prepared on surface in a tub fabricated from a section of ventilating tube, in which rotating paddles are located, these being powered by a Consolidated Pneumatic type 327 drill. From the mixers, the grout passed by a 2 in plain flanged gravity line down the shaft, this terminating in a rubber hose which connected with the Boulder grouter, situated on the sinking stage. A $\frac{3}{4}$ in. air line was taken from the stage manifold to the grouter, which has a pressure reducing system.

The Boulder grouter, which incorporates its own agitating chamber uses some 80 c.f.m., and has a chamber capacity of 4 cu. ft. The high degree of agitation provided by the grouter was particularly important during the operations, in ensuring the injection of a high quality grout.

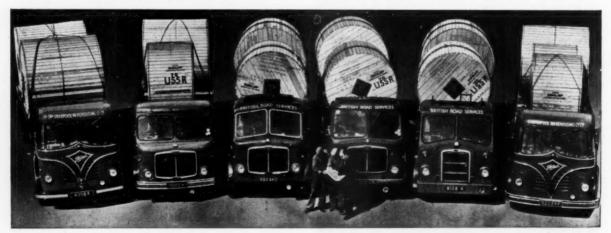
The concrete is brought down the shaft in Blaw Knox 2 cu. yd. concrete skips, these discharge to a folding chute, from the base of which is led four trunk ranges, thus splitting the concrete equally into four parts.

Russia orders miles of 'TERYLENE' CONVEYOR BELTING again and again



1959: 1st order - nearly 6 miles of 'Terulene' belting made by B.T.R. Industries Ltd. is shipped to Russia (see photograph on right).

1961: 2nd order-61 miles of 'Terulene' belting made by the Dunlop Rubber Co. Ltd. ready to be loaded for export to Russia (photograph below).



Russia has recently placed her third order, this time with B.T.R., for 'Terylene' conveyor belting-five more miles of it. As usual, she specified 100% 'Terylene' duck.

Much of the belting is 791 inches wide and 11 inches thick-some of the widest and thickest ever made. It can transmit in excess of 2,000 H.P. with a maximum working tension approaching 60 tons. Despite enormous strength and thickness, the belting is very supple and troughs readily under its own weight.

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^{&#}x27;Terylene' is the trademark for the polyester fibre made by IMPERIAL CHEMICAL INDUSTRIES LIMITED, FIBRES DIVISION, HOOKSTONE ROAD, HARROGATE, YORKS

Preconcentration of Flotation Feeds with T.B.E.

By A. MITZMAGER and J. MIZRAHI

The authors are members of the staff of Israel Mining Industries Laboratories, Haifa. This article is reprinted from "The TBE Bulletin", a publication of Baker Perkins Ltd. in association with Israel Mining Industries

N many types of ores the mineralogical structure is such that part of the mineral constituents is present in relatively coarse crystals and part as a very fine interlocked structure. In such cases, separation of the minerals by flotation requires grinding the whole to a very fine size, -100 or -200 mesh in order to obtain liberation.

Preconcentration of these ores by density separation makes possible the production of a finished concentrate and a middling for additional treatment or the reverse, rejection of a waste, leaving an enriched product for further concentration. In either case, the advantages of preconcentration are numerous for—

- 1 it reduces the tonnage of ore to be treated in the flotation step. In some of the cases studied, a preconcentration unit before a flotation plant would double or triple the capacity of the flotation equipment and reduce proportionally the consumption of reagents per ton of concentrate.
- 2 it saves the cost of grinding extra tons of ore and of carrying it through the whole mill with all the involved expenses and complications.
- 3 in most cases, it produces better metallurgical results. In each case, the cost of the preconcentration step has to be weighed against the saving in investment and operating cost, and the improvement in recovery and grade obtained.

Many flotation plants today use Heavy-Media Separation for preconcentration in the coarse range $(-3 \text{ in.} + \frac{1}{4} \text{ in.})$. The TBE process extends the advantages of preconcentration to finer sizes (down to 100 mesh) and therefore fills the gap between the HMS and the flotation size ranges.

The following three cases of ore samples examined in our laboratories are briefly described as examples of what can be obtained in fine size preconcentration with TBE.

CASE A. A chalcopyrite ore sample submitted by a large company, contained about 1 per cent copper. For a straight flotation process, the whole ore should be ground to obtain liberation of the sulphides from the hard silica gangue. However, the liberation of an appreciable amount of gangue could be achieved at a coarse size as can be seen from the data shown at bottom of page.

According to these figures, a sharp cut at sp.gr. 2.74 could eliminated 67.6 per cent of the coarse (+100 mesh) fraction with a copper recovery of 96 per cent. Taking into account the fines originally present in the crushed ore, the concentrate to be fed to the flotation plant (for the separation of the chalcopyrite from the pyrite and other heavy minerals) would be only 46 per cent of the original feed

with a consequent reduction in the capacity required for flotation and in the reagent consumption.

In order to ascertain if a pretreatment in TBE would affect the flotation behaviour of the ore, tests were done in parallel by conventional roughing flotation and by roughing flotation after preconcentration in TBE. The following results permit a comparison:—

| | | | Af | ter |
|-----------------------|--------|-------------|------------|-----------|
| Percentages | | Conventiona | l preconce | entration |
| To grinding* | | 80.0 | 25.8 | |
| To flotation* | | 100.0 | 46.2 | |
| Roughing weight | | 7.14 | 6.72 | |
| Tailing weight | | 92.38 | 93 · 26 | |
| Flotation tails | | 92.8 | 6 | 39.28 |
| Coarse tails | | 0.0 | 0 | 54.00 |
| Roughing assay, Cu | | 11.8 | 12.7 | |
| Combined tailing assa | ay, Cu | 0.20 | 0.12 | |
| Fletation tails, Cu. | | 0.2 | 0 | 0.23 |
| Coarse tails, Cu | | | | 0.054 |
| Balance: Cu in feed | | 1.028 | 0.965 | |
| Copper Recovery | | 82.5 | 88-4 | |
| * run of mine o | re. | | | |

CASE B. An oxydized lead-zinc ore from an existing plant was examined. It contained 5.4 per cent Zn and 0.57 per cent Pb, as sulphides, carbonates and silicates of lead and zinc, in a complex and diffuse mineralization. This ore is actually treated by a classic flotation method after grinding the whole run-of-mine ore through 100 mesh and desliming the flotation feed. However a substantial amount of barren material could be eliminated between the crushing and the grinding, as can be seen by the following test.

Separation with TBE sp.gr. 2.94

| | | | | | Distrib | bution |
|------------------|-----|-----------|------|--------|---------|--------|
| Fract | ion | Weight* | Pb* | Zn^* | Pb | Zn |
| Feed | | 100.0 | 0.57 | 5.4 | 100.0 | 100.0 |
| Fines (-200 mes | sh) | 20.0 | 0.64 | 6.0 | 24.6 | 22.2 |
| Concentrate (sin | k) | 15.0 | 2.40 | 24.0 | 69 - 1 | 66.7 |
| Tails (Float) | | 65.0 | 0.05 | 0.92 | 6.3 | 11.1 |
| Balance | | 100.0 | 0.52 | 5-4 | 100.0 | 100.0 |
| * per cent. | | | | | | |

* per cent.

A single cut on the -14/+200 mesh material can eliminate 65 per cent of the feed with a recovery of 93.7 per cent and 88.9 per cent respectively on lead and zinc. Thirty-five per cent of the tonnage remains to be upgraded and differentially separated by selective flotation. Therefore, a TBE unit ahead of the flotation plant could triple its capacity with almost the same equipment and might substantially decrease the reagent consumption per ton of concentrate.

CASE C. The recovery of fine size beryl from pegmatite, as described in a previous paper in *TBE Bulletin No. 6*, presents another case of preconcentration. The direct flotation of beryl from low grade ore (about 2-3 per cent beryl) is very inefficient and complicated, while the upgrading of a beryl concentrate from 6-8 per cent BeO to a marketable 10-12 per cent is straightforward. The density process with TBE is therefore used to preconcentrate the ore from 3 to 60 per cent beryl, recovering at the same time the other marketable minerals. Final separation is by flotation.

| Fraction size mesh % by wt. | | +2 45 | | -28 21 | | -48 13 | +100 | +1 79 | 00 | -100 20·4 | |
|---|----|------------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|------------------------|--------------|--|
| Fraction sp. gr. Lighter than 2·673 Lighter than 2·736 Lighter than 2·939 * ber cent. | •• | Weight* 49.0 69.2 75.3 | Cu* 0·052 0·073 | Weight* 54.5 66.2 73.3 | Cu* 0·055 0·070 | Weight* 56.9 64.2 71.3 | Cu* 0·059 0·068 | Weight* 52.0 67.6 74.5 | Cu* 0·054 0·0714 | Cu* 1·19 | Rejected Culfloats* 2·26 3·83 |

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MINERALS EXPLORATION IN THE IVORY COAST

REPORT prepared by the U.S. Development and Resources Corporation outlines a three-year programme for the exploration of minerals in the Ivory Coast. The findings and recommendations of the corporation are summarized in *Mineral Trade Notes* (Vol. 53, No. 4, October 1961) as follows:

Manganese, gold, diamond, and lithium have primary potentiality, and, of these, manganese is believed to be the most promising for rapid development.

Chromium, nickel, platinum, cobalt, graphite, beryllium, tin, and rare-earths have secondary potentiality.

The potentials of iron, copper, lead, and zinc do not warrant exploration at the present time, due to lack of adequate deposits and difficulty of development and access.

There is a recognizable need to catalogue the industrially useful materials, such as sands, gravels, clays, feldspars, and micas

Similarly, a systematic investigation of ground water resources is required to find potable water supplies for towns and villages in certain areas, and also to provide for the on-site requirements of mineral extraction and development.

The continuation of the geological mapping programme is of vital importance.

The complete lack of geological laboratory facilities in the Ivory Coast has seriously impeded the profitable progress of exploration and will continue to do so until this deficiency can be filled.

In many cases airborne geophysical surveys already carried out under contract have not yielded results of the precision and accuracy normally expected.

Modifications are needed in the geophysical work projected to make it more precise and usable.

Recommendations

The corporation's recommendations are intended to cover geological exploration from 1961 to 1963. They are based on the assumption that a total of 22 field parties will be available for the whole period and that work will proceed at an even and regular pace. Obviously, a late start or the employment of less than 22 teams in 1961, will require a correspondingly greater effort in 1962 and 1963.

After putting forward a suggested programme for the allocation of these parties, the corporation makes a series of recommendations relating to exploration methods (emphasizing, always, minimum outlay for maximum results), personnel and laboratory requirements, and a suggested reorganization of the Direction de la Géologie et de la Prospection Minière to enable it to carry out its responsibilities more effectively. Emphasis is placed on the necessity of finding a small, highly-skilled staff and paying the market price for their services. While this staff will originally be obtained from overseas recruitment, the corporation notes that "The eventual aim must be the establishment of a permanent high-quality Ivory Coast geological survey staff. It therefore recommends the establishment of a scholarship scheme for the training of a number of secondary school graduates as geologists.

The corporation estimates that the total expenditures for its survey programme will be \$4,498,000 over the three-year period, with about half this figure falling in the category of personnel costs and consultant services.

G.E.C. STREAMLINES EXPORTS

HE General Electric Co. Ltd. has announced the formation of a new subsidiary, G.E.C. (Engineering) Ltd., into which are being hived off its engineering activities under the leadership of Mr. R. N. Millar, a director of the parent company and formerly managing director of the Engineering group. This is part of a general policy of de-centralizing the main industrial divisions of the group into subsidiary self-contained companies. The manufacturing resources of G.E.C. (Engineering) Ltd. will embrace the electrical engineering works at Erith which together employ over 15,000 people.

This development means that all G.E.C. sales to the mining industry will, in future, be channelled through this company with the exception of equipment relating to mine lighting, telecommunications and some subsidiary electrical transmission equipment which will continue to be manufactured by other companies in the G.E.C. group.

A significant aspect of this new group policy is that G.E.C. (Engineering), and presumably other parallel subsidiaries, will in future be solely responsible for their own overseas selling and sales promotion. It will be interesting to see how this approach to exporting will work out as against the more familiar pattern among large groups with diversified markets (G.E.C. among them), which involves a complex organisational relationship between the regional offices of the group export sales company and the technical sales know-how of the individual manufacturing divisions. The intention of this new arrangement is clearly to make the latter directly responsible for seeking out their own markets overseas rather than to wait until called upon by the export company, which of necessity cannot be expert in all the group's specialisations.

In connection with the establishment of G.E.C. (Engineering) Ltd., it is worth noting that the parent company also has a half interest jointly with an American firm, Thompson, Ramo, Wooldridge Inc., in International Systems Control, in which is vested the group's know-how in the field of electronics and automatic control devices. Automatic controls are already commonplace in winding installations while automation in mineral processing is clearly on the way, so it seems a reasonable assumption that I.S.C. must come to play an increasingly important part in spear-heading the G.E.C. (Engineering) sales effort to mining, as indeed to other industries.

Prospecting in Tanganyika

At the opening of the 36th Session of the Legislative Council of Tanganyika in October last year, the Governor emphasized the importance attached to revenue generated by mining.

In line with this policy, the Geological Survey Division in its latest annual report for 1960 has recorded a considerable increase in the area covered by its regional mapping programme. More geological parties were engaged in the field and covered about 11,400 sq. m.—more than twice the area covered in recent years.

The report states that last year over seventy professionally trained geologists, including officials of the Division and the staffs of mining and prospecting companies, were engaged in the search for economic mineral deposits and the development of known occurrences in Tanganyika.

Purer Copper.—In view of the rapidly growing demands for copper with higher electrical conductivity, American Metal Climax Inc. has decided to double its U.S. capacity for the production of oxygen free high conductivity copper, sold under the brand name OFHC. The company is to spend \$1,755,000 on the construction of new melting, casting and handling facilities at the works of its subsidiary, the U.S. Metals Refining Co., Cartaret. The demand for the purer copper has doubled since 1957, due to advancing technology in electronics and in some areas of the electrical cable industry. No other company, it was stated, is producing this purer form of copper commercially.

Old S. Rhodesia Gold Mine to reopen.—Over £24,000 has been spent on reclaiming the old Ayrshire gold mine, near Banket, in Southern Rhodesia, where production is to start early in 1962. When the first stage is opened, 3,000 tons of ore a month will be milled.

U.S. Loan for Japan Steel Co.—In addition to the \$6,500,000 Export-Import Bank loan to the Japan Steel and Tube Corporation, a loan of \$3,000,000 is being made from the First National City Bank of New York, for the construction of the company's Mizue iron works, and for the purchase of a tinning mill from Wean Engineering in the U.S.

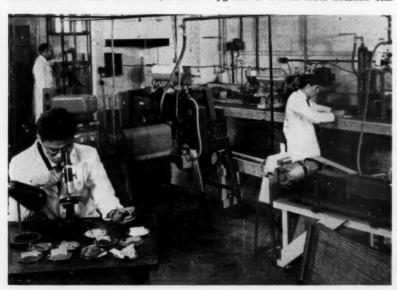
Japanese in Peru.—The Japanese firm, Chubel Itah Co., is to develop Peruvian iron ore mines jointly with local mining interests, according to a report by the Bank of London and South America. The Japanese company is to provide finance for the building of mining installation and port facilities, in return for sole purchasing rights for all the ore produced.

U.S. Consultants for Indian Copper.— The National Mineral Development Corporation of India have signed an agreement with Western Machinery Co., of Utah, who are to provide consultancy services for the copper project at Khetri, through their division Western Knapp Engineering. The plant has an estimated minimum annual production of 10,000 tons of electrolytic copper.

Malayan Reaction to I.T.C.—The All-Malaya Chinese Mining Association has expressed "bitter disappointment" at the International Tin Council's failure to fix a new price range for tin. The Association has decided to press for a new minimum price floor of £800 and a ceiling of £1,000 per ton at the I.T.C. meeting next February. It is also to make representations to ensure that no U.S. stockpile tin is sold on the market below £1,000 per ton.

Japan's interest in Latin American ores.—The Bolivian Investment Committee has given permission for the Mitsubishi Metal Mining Co. of Tokyo to embark on a U.S.\$8,770,000 exploration and exploitation programme of copper ore deposits in Carangas. Mitsubishi are to invest \$1,400,000 initially. Japanese interests are also reported interested in exploiting iron ore reserves recently discovered in the Vallenar district of Northern Chile. Although it had been planned to exploit these ores by Gran Mineria Chilena, a wholly Chilean concern, it is doubtfai if the project can be financed without foreign aid. From Brazil, it is stated that negotiations are almost complete for the shipping of 10,000,000 tonnes of iron ore to Japan, the Brazilian State company, Cia. Vale do Rio Doce to buy ships for the purpose. The return shipments will be of South-East Asia crude oil.

Sir John Cass College, the only centre of advanced scientific studies in the City of London, has recently extended the facilities of the Department of Metallurgy by the provision of a mineral dressing laboratory. The equipment, much of which was supplied by the Fraser & Chalmers Works of G.E.C. (Engineering) Ltd., has been chosen to demonstrate to second year metallurgy students the basic principles of various mineral dressing techniques. However, the apparatus is just as well suited to mineral dressing test work. The G.E.C. equipment installed in the laboratory includes an Armstrong classifier, grinding equipment, a Sherwen electromagnetic feeder complete with hopper, a Sherwen test-sieve shaker, a Wilfley No. 13A concentrating table with interchangeable decks riffled for sand and slimes, a Denver jig and a Denver froth flotation cell.



MINING

Dominion Republic —. A National Council for Economic Planning is to be set up by the Dominican Republic. It will advise on the use of revenue to encourage maximum economic growth and will integrate various plans and studies for the development of minerals, agriculture and new industries.

Pelletizing Iron Ores.—The Iron Ore Co. of Canada is reported to have decided to proceed with the construction of a pelletizing plant for its iron ore project at Carol Lake, scheduled to begin production next year. The plant is to be located near the Carol Lake concentrator and is expected to cost in the region of \$60,000,000. This sum will be additional to the \$150,000,000 being spent on mine development, on building the concentrator, and on the construction of a branch line. The concentrator will have a rated capacity of 7,000,000 tons of concentrates a year and will treat more than \$50,000 tons of crude ore a day. Situated on the Labrador side of the Quebec-Labrador Trough, Carol Lake is the second major development in this region by the Iron Ore Co. of Canada.

Quebec Zinc Refinery.—Five mining companies are to be associated in the construction of a \$20,000,000 zinc refinery near Valleyfield, Quebec, some 40 miles west of Montreal, which will be the first refinery of its kind in Eastern Canada. The companies participating in this project are Mattagami Lake Mines, Orchan Mines, Geco Mines, Quemont Mining Corporation, and Normetal Mining Corporation. Each company will own an undivided portion of the refinery and each will have an integrated ore to ingot production. The refinery will be geared mainly for the export market. Construction is to be started immediately with completion scheduled for December, 1963.

Mining Greek Nickel.—The concessionaires of the Larymna nickel mine have signed an agreement with the French firm, Societe Le Nickel, for the formation of a company to exploit the iron and nickel deposits at Larymna. Annual production is expected to reach 4,000 tons of nickel and 50,000 tons of pig iron.

Indonesian Tin. — British experts are en route to Djakarta, according to a statement by the president-director of the Indonesian State Mining Enterprises. They will study Indonesian plans to open new tin workings under the sea.

Sealing the Levant Workings.—A Holman Rotair 150 rotary screw type compressor aboard John Mowlem & Co. Ltd.'s crane ship, the M.V. Ebury, moored over the undersea workings of the Levant mine in West Cornwall, is supplying air for the grouting of aggregate to seal off a breach in the sea bed which flooded the workings in the early 1930's, some years after the mine had closed. Mowlem's are contractors for Geevor Tin Mines Ltd. of Pendeen who want the Levant mine de-watered so that they can extend their own workings to the west. This operation will also enable Geevor to develop the lodes of the Old Wheal Cock and Crown Mines, which follow the same pattern as Levant and extend well out to sea.

GM SCELLANY

Mine to End Product Integration.—A report from New York states that Continental Copper and Steel Industries, Inc., is actively proceeding with a programme having for one of its aims "eventual complete vertical integration of its wire and cable processes, from copper mines to finished cable." To implement this programme the company "is actively seeking additional controlling sources of its basic raw material, copper, both in the U.S. and abroad." Last year the company secured a controlled source in Haiti (the Consolidated Halliwell undertaking) for a substantial portion of its copper needs.

Offshore Diamond Recovery.—Atlantic Diamond Corporation, with a capital of £100,000, has been registered in Windhoek with the objective of recovering diamonds from the sea-bed in South West Africa. The new company states that it has acquired four concessions embracing an eight-mile stretch north of the Orange river. Recently a company known as the Marine Diamond Corporation was formed for a similar purpose (The Mining Journal, August 11, 1961, p. 143) and now has a vessel on the spot.

Polish Coal Exports.—The Polish Ministry of Foreign Trade estimates that 1961 Polish coal exports will be over 17,000,000 tons, slightly above the target planned, of which over half is to countries outside the Iron Curtain. In addition to hard coal, Poland will export some 6,000,000 tons of lignite and over 2,000,000 tons of coke during the current year.

Upgrading Indian Manganese. — The Indian National Metallurgical Laboratory is building a heavy and integrated pilot plant, claimed to be one of the biggest of its kind in the world, at Jamshedpur for the processing of low-grade manganese ore. A pilot electric arc furnace for smelting ferro-alloys is also being installed at the laboratory.

Processing Coal Refuse.—A plant which processes the coal refuse heaps from the Polish mines, extracts the remaining coal, and processes the residue into construction material, has been operating at full capacity in the area of the Michal Mines in Poland, and processes 1,400 tons of coal refuse daily. The plant was built by the Haldex Hungarian Polish Co., and the treatment, carried out by the hydro-cyclone system, is considered so successful that four more coal refuse exploitation plants are to be constructed by the company.

Japanese in Malaya.—A new company, Malayawata, has been formed to construct an iron and steel mill on the west coast of Malaya at an estimated cost of \$52,000,000. Of the company's capital, 51 per cent will be raised by Malayans, and 49 per cent by the Yawata Iron and Steel Co. of Japan. The first stage of construction, which should be completed by March, 1964, will have a production capacity of 120,000 tons of sponge iron and 60,000 tons of small bars annually. The second stage, at an estimated cost of \$30,000,000, will be started when the Cameron Highlands hydro-electric scheme is completed.



With the recent opening of a sales and service depot in Cardiff, the fifth stage is reported to have been reached in the expansion plans of Ruston-Bucyrus Ltd., to bring after sales service closer to their customers. The new depot, at Cowbridge Road West, serves the whole of South Wales. Depots have already been established at Warrington (North-Western Area), Taunton (South-Western Area), Colnbrook (London and South-Eastern Counties), and in Glasgow for the whole of Scotland. A sixth depot will be opened in Birmingham at the end of the Pear and another in Harrogate in 1962

Magnesite complex for Silesia.—In the Schweidnitz district of Silesia, a magnesite industry is to be developed, based on reserves recently discovered. Total investment in the project is estimated at about 300,000,000 zloty. The magnesite is to be processed at the Zloty Stok combine.

Madagascar's Mineral Exports.—A total of Frs.784,000,000 worth of mining products was exported by Madagascar during 1960, compared with Frs. 630,200,000 in 1959 and Frs.524,100,000 in 1958, representing tonnages of 21,175, 15,499 and 15,711 respectively. Prospects for 1961 are reported to be generally good, with graphite the principal mining export, and mica coming second.

Coal Deposit in E. Pakistan.—A coal seam, in places 170 ft. thick, has been discovered in the Bogra-Rajshahi area of East Pakistan. The seam was struck at about 9,000 ft., but this is too deep for economic exploitation. The Geological Survey of Pakistan, who, with the collaboration of the U.N. Special Project Fund are exploring the area, hopes that this coal belt, which is a continuation of the adjoining Gondwana coal belt of India, may emerge at a higher and more workable level elsewhere in Pakistan.

New Russian Diamond Field.—The new diamond area discovered in the valley of the Sokhsolookh River is considered important by the Soviet authorities, according to an account in the New York Times, who report that the Russians are diverting resources from the diamond area near Mirny to the new field.

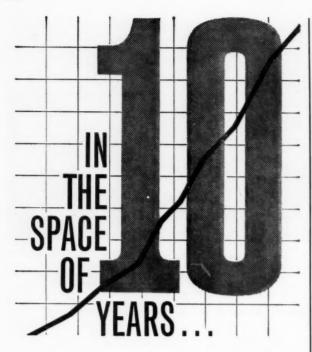
South Vietnamese Mineral Reserves.— The mineral reserves of South Vietnam are stated to contain, in addition to coal, large supplies of chalk, brick clay, fayence clay and peat, the latter deposits, in the west of the country not yet having been exploited. Phosphates exist on the Paracelsus and Spratley islands, off the country's east coast. The following substances are also stated to be present in exploitable quantities: gold, bloodstone, tin, zinc, mica, graphite, lead, copper, molybdenum, tungsten and titanium. Pakistani Natural Resources.—An Advisory Body of 44 members has been set up for the Pakistan Ministry of Fuel, Power and Natural Resources, to advise the government on problems relating to water, power, mines and minerals, and will suggest measures for speedier modernization and exploitation. The chairman will be the Minister of Fuel, and the vice-president the Secretary of the Ministry.

Gagarinite.—A new yellowish-brown mineral, containing rare earth elements, which has been discovered in East Kazakhstan, has been named by the Russians Gagarinite, after the world's first cosmonaut.

Rhodesian Mining Order.—Rhodesian Selection Trust Exploration have been granted an exclusive prospecting order in respect of nickel over about 146 sq. miles in the Hartley mining district, according to a report from Barclays Bank D.C.O. The company must spend £35,000 on operations within the reservation before the expiration of the order, at end-september, 1964. The government has agreed to the remission of royalty on asbestos outputs won by Rex Asbestos Mines from their mining locations, situated in the Fort Victoria mining district, during the year ending June 30, 1962. The government has also agreed that no royalty shall be payable during the same year on chrome outputs won by Windsor Chrome Mines (1959) from their mining locations in the Gwalo and Hartley mining districts.

Iranian Chamber of Mines Proposed.— The Iranian Government is reported to be studying a proposal for the creation of a Chamber of Industry and Mines in Iran.

Japanese order aids Australian Coal.—A Japanese order, worth £A10,000,000, has been received for Australian coal from the Kianga open-cut field in Queensland. During the five-year period starting next March, 2,400,000 tons is to be shipped. The nearby port of Gladstone will be modernized to handle this trade. Australian coal exports to Japan are expected to be worth about £A7,000,000 during 1961.



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Machinery and Equipment

Jar-Bar Grizzly Feeders

A new range of jar-bar grizzly feeders is now in production at the Fraser & Chalmers Engineering Works of The General Electric Co. Ltd. One of these feeders was shown for the first time at the last Public Works Exhibition and since then G.E.C. has received orders for several machines, some of which are already installed.

These feeders, which are the first of their type to be manufactured in this country, are particularly suitable for removing clay or sticky fines from ore or stone before it enters a primary crushing plant. Two types of machine are available, one for standard duty and the other for heavy duty, and both types can be fitted with 8, 10, 12 or 14 rolls. Heavy-duty machines can be provided having widths of 48 in., 60 in. or 72 in. with capacities up to 5,000 t.p.h. Standard-duty machines are available in widths of 24 in., 30 in., 36 in., or 48 in. and capacities up to 2,000 t.p.h.

The design of any good crushing installation should ensure that no material which is already to size passes into the crusher. In a primary crushing plant this means the elimination of natural fines up to the size chosen for the crusher discharge. Furthermore, two separate requirements must be met in order to feed the crusher. The ore must first be withdrawn from the feed hopper and then the

fines must be removed before material enters the crusher.

One of the conventional ways to do this is to employ a feeder in conjunction with a heavy-duty scalper. In order to save space and money the multiple-roll grizzly has been developed to act as both a screen and a feeder, so that only one machine is necessary. This type of grizzly usually employs circular rolls with a fixed discharge arrangement, and because the machine has to be mounted in a declined position to keep the ore moving, skidding of the material over the rolls sometimes occurs.

Alongside, at right, the Eimco Model 123 front end loader

Below, at bottom of page, assembly of a 48 in. 8-roll jar - bar grizzly



The new G.E.C. Jar-bar Grizzly Feeder employs elliptically-shaped rolls and since the rolls are arranged with the major axes of adjacent bars at right angles, forward feed can be obtained with the machine mounted horizontally or even inclined upwards. Skidding of the material over the rolls is thus reduced to a minimum.

A further advantage not obtainable with the conventional systems already described is the ability of the feeder to spread the fines load evenly over the conveyor belt. This is possible because the discharge setting can be varied for each pair of rolls, so that a graduated discharge size, say from 1½ in. up to 10 in. may be obtained on one machine.

The feeder consists of a series of elliptical rolls or bars rotating in the same direction with the major axes of adjacent rolls at right-angles. The rolls are so shaped that the aperture between adjacent members remains constant throughout the whole circle of rotation.

In operation, lumps of rock which are in contact with the rolls are alternately lifted and dropped, and at the same time

are moved forward as the elliptical sections rise and turn over. This occurs twice per revolution. As the major axes are at right-angles, the pieces of rock over adjacent rolls are moving in opposite directions, one rising while the other is falling. This results in the generation of a rocking motion with a rubbing as well as a sifting action, which has the effect of not only shaking the fines rapidly downwards, but also of breaking up any large lumps of clay and working them downwards as well. On reaching the bars the fines pass through freely; although the clay tends to stick it is forced down between the bars by the weight of the rock continually dropping on top of it.

100 h.p. FRONT END LOADER

An "up-front" position for the operator, making for safety, efficiency of control and improved balance, is one of the features of Eimco's new Model 123 front end loader. This 100 h.p. crawler-based machine exerts a maximum breakout force of 25,000 lb. and can operate on 1 in 1 slopes, forwards or backwards with a full bucket load. The Model 123 is one of a range of earth moving and mining equipment available from Eimco (Great Britain) Ltd.

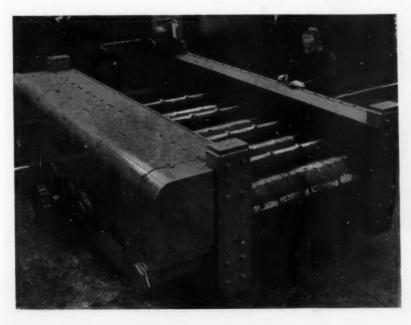
The new loader has a bucket capacity of 1½ cu. yards. It will dump at heights up to 115 in. and has a dump reach of 44 in. A complete cycle of lifting, tipping and lowering the bucket is carried out by four hydraulic rams in less than 15 secs.

NEW BRATTICE MATERIAL

A new heavy nylon brattice material has been developed for use in mines, by Mine Ventilation Systems, Inc., U.S. The new fabric, Herculite, is being used successfully as back stoppings in some mines in West Virginia. The brattices are manufactured of laminated heavy nylon cloth, coated with liquid vinyl to render it fireproof.

The material, approved by the U.S. Bureau of Mines, has been used at U.S. Steel's Gary No. 2 Mine, where a 2-year old line curtain is still in use and in good shape.

Herculite has been approved by the U.S. Bureau of Mines for use on butt entries only.



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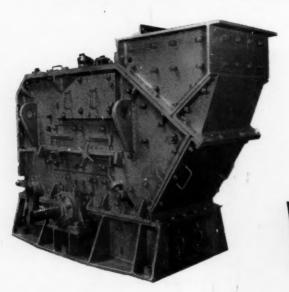




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CENTO COAL -SYMPOSIUM -

The Turkish government, through its highly developed Turkish Coal Enterprises, has agreed to act as host for a CENTO Coal Symposium to be held at Zonguldak, Turkey and other mining centres between November 30 and December 14, 1961. CENTO participants to this conference from Turkey, Iran, Pakistan, the U.K. and the U.S. will offer a series of comprehensive papers and discussions covering the economics of coal production, mining problems, and the geology of coal mining. Participation by CENTO country delegates is being financed by the United States through the Odice of the U.S. Economic Coordinator for CENTO Affairs. A number of commercial firms are also expected to send observers to the Symposium. Papers are invited to be presented at the Symposium by observers as well as delegates.

Tour of Inspection

In addition to the technical papers to be offered at the formal sessions at Zonguldak, the experts will inspect surface and underground mines, coal washeries, power plants, and harbour facilities at Zonguldak. During the following week the group will inspect mines in the vicinity of Eskiseher, including the Seyit Omer lignite strip mine and the Tunçbilek open pit and underground mines. At Soma near Izmir the experts will inspect the Camlica mine and visit the famous ruins at Bergama.

Copies of the resulting report will be available by writing directly to the CENTO Secretariat, Old Grand National Assembly Building, Ankara, Turkey, after January 1, 1962.

AUSTRIAN MINING CONGRESS

The Mining College of Leoben, Austria, is to hold a special Mining Congress, September 12-18, 1962, following its tradition, to hold a special event every 25 years. The general title is "Mining Development Trends in Research and Industry". Papers will be given by experts from many countries, and enquiries should be made to the Geschaftsstelle des Bergmannstages, Montanistische Hochschule, Leoben, Austria.

GEOPHYSICIST

In early 1952 we require an experienced man who can meet the following specification:— (a) Honours Gradua'e in Geology and/ or Physics. (b) Post graduate studies in geophysics to Ph.D., M.Sc., or D.I.C. standard. (c) Field experience in all forms of ground geophysics. (Airborne geophysical experience would be an added advantage.) The Company undertakes a wide variety of Geophysical work including airborne, engineering, mining and hydrological studies. Essential details to: The Personnel Manager, Hunting Surveys Limited, 6 Elstree Way, Boreham Wood, Hertfordshire.

Two Exhibitions at Earls Court

International Factory Equipment

EQUIPMENT and machinery produced by over 350 firms will be seen at Earls Court on November 13 when Dr. Richard Beeching, chairman of the British Transport Commission, opens the International Factory Equipment Exhibition.

Now in its ninth year, the exhibition (November 13-18) will occupy some 375,000 sq. ft. The exhibition is sponsored by the London Chamber of Commerce, The Financial Times and Industrial Equipment News.

Technical Apparatus

Among the mass of highly technical apparatus on view at the Exhibition will be one stand devoted to the products of Marlow Ropes Ltd., the synthetic ropemaking division of Hawkins and Tipson Ltd., the first company of its kind to exhibit at this event. The stand will be devoted to showing the application of synthetic fibre ropes in a wide range of industries and experts will explain how modern manufacturing techniques in ropemaking have kept pace with mechanised production methods.

Mine Safety Appliances Co. Ltd., Glasgow, specialists in industrial safety equipment and instrumentation, make their first appearance at the Exhibition. Exhibits will include examples from the company's wide range of items of personal protection, including breathing apparatus. Portable and permanent instruments for the detection of combustible and toxic hazards also will be snown.

Several new items will be exhibited for the first time in Britain. One of these is the M.S.A. Model 40 combustible gas indicator. Designed specifically for industrial hygiene work, this instrument has a dual scale meter graduated from 0-100 p.c. of the lower explosive limit and also from 0-10 per cent of the lower explosive limit. In addition to the indication of flammable gas and vapour-in-air mixtures, the instrument allows the direct measurement of certain toxic vapours. The new Model 40 C.G.I. is supplied with a patented 5 ft. sampling line which stabilises the humidity of samples and eliminates the need for a dessicator and its periodic refilling.

The recently announced M.S.A. general purpose methanometer is an accurate and robust portable instrument fully approved by the Ministry of Power. Compact and easy to operate, the standard G.P. methanometer has a range of 0-5 per cent methane, the meter being graduated in 0.2 per cent divisions. The filaments used are of a type developed in conjunction with the Safety in Mines Research Establishment and feature stability and extremely long life.

A ventilation smoke tube assembly for detecting the speed and flow of slow-moving air currents also will be shown for the first time. In addition to the above, M.S.A. will feature a completely new range of attractively styled spectacles for eye protection. Other exhibits include an infra-red analyser and the combustible gas analyser

Engineering Materials and Design

A CONFERENCE on engineering materials and design at which experts from leading laboratories, colleges, industry, government departments and advisory bodies will speak, is to be held concurrently with the Engineering and Design Exhibition at Earls Court, London from November 13-18. Twenty-two separate lectures will evidence at first hand the developments that have emerged from recent research and cover aspects of design in a most varied range of materials and applications.

The opening address will be given by Sir William G. Penney, K.B.E., Deputy Chairman U.K.A.E.A.

Johnson Matthey will present a continuous demonstration of low-temperature silver brazing as a means of mass-producing assemblies. The stand also will show Mallory resistance welding electrode materials, including a new series of spotwelding electrodes produced from ½ in diameter bar, and a new alloy, Mallory 328, developed from the well-known Mallory 3 but with better properties at working temperatures.

Many J.M.C. specialised products and materials will be shown. These will include Mallory 73 beryllium copper, now supplied with beryllia-free surfaces to improve press-tool life, and Mallory 53, a new high-conductivity spring material.

Prominent among the wide range of non-ferrous tube products will be capillary and restrictor tubes. Further sections of the stand will feature J.M.C. products for chemical engineering and the electrodeposition of noble metals.

The U.K. Atomic Energy Authority stand will consist of some sixteen items which will show, by photographs, models and the actual equipment, the work of the various establishments of the U.K.A.E.A. on materials, components and their present and potential applications.

Study of Beryllium

Among the subjects of study covered is that of beryllium. Recently, apart from its main application in the nuclear field, there has been a significant demand for the evaluation of beryllium as a structural material. The A.W.R.E. exhibit details their investigation of the unique metallurgical and engineering properties which make this metal suitable for light rigid structures over a wide range of temperatures. A comparision with the properties of the more conventional materials is made, the causes of brittleness of beryllium at high and low temperatures described and the progress over the last six years of the methods used to alleviate this disadvantage illustrated. Overall it is shown that much development and wider application should be possible for this metal.

The Springfields exhibit is devoted to the use of beryllium in nuclear energy in particular as a canning material for the A.G.R. reactor. Its nuclear and other relevant properties are compared with those of other materials showing the advantages that can be expected from the use of beryllium.

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Metals and Minerals

Wolfram's Encouraging Outlook

After wolfram's relative stability in 1960, when U.K. prices ended the year as they began it in the region of 150s. per 1.ton unit, the performance of prices and markets in 1961 has been a disappointment. Offerings of Russian and East European ore during the early part of the year contributed to a slide in prices, which by mid-April had fallen to 120s. per unit. After rising to 130s. 6d. in June prices turned downwards again, and so far the expected revival has failed to materialize. Whereas Russia was considered to be chiefly responsible for the spring recession, China is currently being blamed for forcing the market down. The Chinese, it has been alleged, are out to gain a foothold in the West at almost any price. It is possible that these fears may prove to be greatly exaggerated. Meanwhile the market continues to give ground and at the time of writing quotations have fallen to 106s.-110s. per unit, which compares with 120s.-123s. a month ago.

In these depressing conditions the confidence expressed by the chairman, Sir Christopher Ll. Bullock, in his address to shareholders of Beralt Tin and Wolfram Ltd., comes a timely reminder that, however cloudy the immediate outlook, wolfram's long-term outlook remains no less promising than before.

In this context the chairman referred to the very large sums which continue to be spent in the U.S.A. on research and experiment in the field of tungsten and its products. He cited a recent report which speaks of tungsten as one of the four metals regarded as being the most promising for rockets and similar missiles, whether for space exploration or for military purposes, and which states that over \$20,000,000 is being spent on research into these metals in the current

Several interesting developments, for example in fabricating technique, have been reported as a result of this research. If these prove capable of commercial application—and some of them have already done so—new uses may well emerge which will substantially enhance demand. Sir Christopher emphasized that in any case demand should tend to increase during the years as world industrialization develops and spreads into new countries. For what it is worth, he recalled that the U.S. Materials Policy Commission (Paley Report) estimated in 1952 that world consumption of tunesten might increase by 150 per cent by 1975.

Shareholders were also reminded that the present unbalance between demand and supply stemmed mainly from the action of the U.S. and U.K. Governments at the time of the Korean crisis in artificially stimulating world production beyond normal commercial requirements. Though many mushroom mines have since been forced to close down, world supply of wolfram, swollen as it is by increased production from Russia and China, appears still to be a little out of balance with demand. Unfortunately, comments Sir Christopher, in the two last - mentioned countries ordinary economic considerations are of little account.

In the U.S.A. consumption of concentrates in 1960 was the highest since the

war, but figures for the first six months of 1961 showed a decrease of 28 per cent on those for the corresponding period of the previous year, although still remaining better than in 1958 or 1959. A number of U.S. mines previously closed down re-opened during 1959 and 1950, and domestic producers supplied the bulk of consumers' requirements in 1960, and still more so in the first half of 1961. It remains to be seen to what extent U.S. domestic producers can continue mining at the present low price, despite the protective duty on foreign imports.

From time to time this year there has been a considerable demand from Japan, which has partially offset the decrease in sales to the Continent and the U.S.A.

The chairman also touched upon another disturbing factor, namely the availability of government surplus stocks in the U.K. While there has so far been no repetition of the serious price debacles of 1957 and 1959 caused by these stocks being pressed on a market in no condition to absorb them, the knowledge that they are awaiting sale must have an adverse influence on the market. Describing continuance of the present state of affairs as unfair to producers, Sir Christopher suggested that the Authorities might well fix and announce a minimum price below which they would not sell; or a scheme might be devised on the lines of the rubber disposal scheme whereby, within a prescribed price range, a "tap" would be automatically turned on and off. (See page 499.)

RUTILE AND THE CHLORIDE PROCESS

The upward movement in Australian rutile shipment prices has gathered momentum during the last week. For shipment in the first half of 1962, dealers' ideas now range for the most part from £28 to £30 per l.ton c.i.f. Europe for minimum 95 per cent material. Slightly higher indications have even been heard of in isolated instances. First half shipment prices were previously quoted at £26—£26 10s.

This recovery has been inspired by reports that Du Pont has decided in principle to extend its use of the chloride process for the production of titanium pigment and that the starting material will be Australian rutile. A few months ago Du Pont obtained a trial shipment of 1,000 tons of Australian rutile for evaluation. The results of the tests have evidently been favourable, for it is now reliably reported that the company has circularised Australian rutile producers, to the effect that it is considering the purchase of quantities amounting to between 30,000 and 40,000 tons annually over a period of several years. Not only would purchases of this order remove a large tonnage from the market, but Du Pont's extensive use of the chloride process might well trigger off a greater demand from other countries.

The general opinion appears to be that in any contracts entered into by Du Pont, a fixed price in the region of £A32 10s. f.o.b. will be agreed upon, and that once this figure is known the open market price will probably go to a premium over it. This presumably is the reason why

most Australian producers have currently withdrawn from the market. Meanwhile, pending clarification of the situation, the new price range is regarded as largely nominal.

It is unlikely that the installation of new titanium capacity based on rutile and the chloride process would have any impact on the ilmenite market, having regard to the rising trend in world pigment consumption and the improving position of the traditional starting material.

PROJECTIONS OF NON-FERROUS METAL GROWTH

Qualified projections on the indicated consumption of aluminium, copper and lead in the year 2000 were given at the Mining Club, New York, by Dr. Hans H. Landsberg, an authority on economic appraisal for Resources for Future, Inc., of Washington. Dr. Landsberg is coauthor of a report entitled "The Future of the Major Metals", published at the end of October.

The most rapid rate of growth in the next forty years is foreseen for aluminium, due mainly to increasing requirements for building and transportation. Dr. Landsberg predicts that by 1980 U.S. consumption may reach 7,500,000 tons a year and that by A.D. 2000 an "owner-operated" vehicle might contain as much as 600 lb. of this metal.

Copper's growth rate is expected to be about 3 per cent per year, the main impetus coming from applications in the building industry. While the U.S. gross national product is likely to double by 1960, lead's progress will lag behind this rate, an average increase of about 2 per cent a year being foreseen for it.

S. AFRICAN MINERAL PROCESSING INVESTIGATION

A statutory sub-committee has been appointed by the Natural Resources Development Council to investigate the desirability of processing certain minerals in South Africa for export purposes, according to an announcement by the Minister of Economic Affairs and Mines, Dr. N. Diederiche.

Initially, the sub-committee's investigation would cover asbestos, chrome, copper and manganese, the Minister stated. Its findings and recommendations will be submitted to the Ministry as a guide for determining what future encouragement is required for expanding the processing of minerals for export.

DUCTILE COBALT STRIP

Sherritt Gordon Mines Ltd., of Canada, is now making pure cobalt strip with good ductility and claims that this material has become commercially available for the first time. Previous material, it was stated, lacked the ductility and formability required for most commercial needs. The strip, which is more than 99.9 per cent pure, is expected to find many uses where high temperature and corrosion resistance is required.

LITHIUM IN SPACE ENGINES

According to Dr. H. O. Noeske, rocketdyne scientist of North American Aviation, a mixture of lithium and hydrogen can increase the efficiency of an electric

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arcjet space engine by 25 per cent as compared with the use of hydrogen only. The impulse thrust per unit of propellant is also improved. The technique requires special metals, which were not disclosed.

G.S.A. TO SELL TIN SLAGS

The U.S. General Services Administration have invited sealed bids for the purchase of about 18,700 tons of surplus tin slags, the closing date being April 4, 1962, at G.S.A. headquarters in Washington. The slags, which contain columbium and tantalum pentoxides, were produced in Malaya as a by product of tin smelting. Approximately 4,174 tons were stored at Niagara Falls and 14,732 tons at Welland.

ZIRCONIUM FINDS A NEW MARKET

A report from Pittsburgh states that zirconium metal is finding a promising new market in the manufacture of syphons designed for operation under highly corrosive conditions, such as are encountered in steel mill pickling tanks. A syphon makes use of the vacuum principle to transfer powders, gases or fluids from one container to another. In the steel industry the most common use for this device is in the transfer of was(e acids from pickling vats to tank cars or disposal areas. In this application parts of the syphon are submerged into the acid bath; in other situations they are frequently subject to corrosive fumes as well as to occasional mechanical abuses. According to Allegheny Ludlum Steel Corp., which vacuum melts and rolls zirconium in most mill forms. zirconium tubing has been used in pickling vats for more than 18 months without corro-

sion, whereas in some cases syphons made of conventional materials, such as iron or steel, last less than a week.

Very large quantities of syphons are used by the steel industry. Attempts have been made to make them out of various plastics and rubber compounds, which, however, have not proved satisfactory in steel plant service. Despite its high cost,

zirconium—currently priced in the U.S. at \$11—\$30 a lb. in mill product form—is likely to prove economical in the long run.

Other uses are foreseen for zirconium in the custom manufacture of equipment for the chemical industry, especially where high resistance to heat and corrosion is required.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

During the week under review copper prices have advanced mainly on news of a probable strike in Chile. The tin price has receded after the very sharp rise in the previous week. Both the lead and zinc prices have declined with the undertone remaining weak.

ANOTHER COPPER STRIKE IMMINENT

The copper market has been supported by the continuance of the strike at Mount Isa and the realisation that there is little likelihood of any agreement being reached in Chile before the weekend, when a strike is due at Potrerillos and El Salvador on the expiry of the sixty day period of truce. It appears that the strike at Mount Isa is likely to continue for some time, as the company appear to be making a firm stand against what they consider to be unreasonable demands. With industry in Australia operating at a satisfactory level, that country may become a buyer in the world market in the near future. In Chile apart from the nearby strike probability, there is also the position of Chuquicamata, where negotiations for a new labour contract to

begin on January 1 have also run into difficulties.

The price in London has not been as strong as some people had expected owing to the lack of demand from Europe. Although an appreciable tonnage of fire-refined ingot copper has been shipped away, this has been replaced to some extent by new metal; stocks in L.M.E. warehouses only showed a fall of 225 tons at the end of last week to a total of 15,335 tons. The contango, however, has almost completely disappeared.

In the States merchant copper is available at 30½ cents per lb. whilst producers and custom smelters maintain the 31 cents per lb. level. Smelters intake prices for No. 2 scrap now stands at 24½ cents per lb. In the U.K., consumption of copper during September totalled 60,028 tons, considerably above the August figure, but the total for the first nine months of the year at 511,562 tons is 5 per cent below the corresponding period of 1960.

TIN MARKET AWAITS G.S.A. SALE

After the sharp rise in the tin price late last month there has been a period of consolidation, and the market has been marking time pending the result of the 1,000 ton sale by the G.S.A. on November 8. Although stocks fell by a further 214 tons to a total of 4,219 tons, the backwardation established has given way to a slight contango, although this is not expected to last for any considerable period as the tonnage of free stocks must be very limited.

In the U.K., consumption in September totalled 1,849 tons, which was considerably better than the August figure. For the first nine months of 1961, however, the consumption of 16,001 tons was 6 per cent below the corresponding period of last year. Shipments of tin from Penang during October amounted to only 4,653 tons as compared with 7,690 tons in September, and of the tonnage shipped almost half went to the United States. Shipments from Singapore were negligible.

The International Tin Council have issued figures showing that the nine production of tin in concentrates in July totalled 14,200 tons as against 13,300 tons in June. Preliminary figures for August, however, indicate that the production of Malaya and Indonesia were both lower for that month. World smelter production of metal in July is estimated at 13,700 tons, some 100 tons higher than in the previous month. Figures seem to indicate that the high grade tin alloy trade conducted by Germany is coming to an end; the consumption of tin for that country in July is estimated at 2,000 tons as compared with an average of 3,300 tons a month during the first half of the year. Total world consumption is estimated to have fallen

LONDON METAL AND ORE PRICES, NOVEMBER 9, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230
per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 6d. lb.
Cerium (99%) net, £18 0s. lb. delivered U. K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt. 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, £50s. 1½d.
Iridium. £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram

Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96 %/98 %) £275/£285
Nickel, 99.5% (home trade) £660 per ton
Osmium, £17/£22 oz nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £27 7s. 6d. (£27 17s. 6d.
Quicksilver, £60 ex-warehouse
Rhodium, £43/£45 oz. nom.
Selenium, 48s. 6d. per lb.
Silver, 80d. f. oz. spot and 80¾d. f°d.
Tellurium, 37s. 6d. lb.

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|------------------------------|---------|----------|-------|-----------|------|--------|--------------------------------|---|
| Beryl (min. 10 per cent BeO) | | | | | | | | 270s./275s. per l. ton unit BeO |
| Bismuth | | | | • • | | | * * | 65 % 8s, 6d, lb c.i.f. 18/20 % 1s, 3d, lb, c.i.f. |
| Chrome Ore— | | | | | | | | |
| Rhodesian Metallurgical (s | semifri | able 48 | %) | (Ratio 3 | | | | £15 5s Od per ton c.i.f. |
| ., Hard Lumpy 4 | 5% | | | (Ratio 3 | : 1) | | | £15 10s. 0d. per ton c.i.f. |
| Refractory 40% | 4 | | | | | | 4.4 | £11 0s. 0d. per ton c.i.f. |
| " Smalls 44% | | | | (Ratio 3 | : 1) | | | £13 5s. 0d. per ton c.i.f. |
| Pakistan 48% | | | | (Ratio 3 | : 1) | | | £11 15s. 0d. per ton f.o.b. |
| Columbite, Nigerian quality, | hasis ' | 70 % co | | | | | 0 10:1) | |
| Commone, regenan quanty, | Cuara | 10 /6 00 | 11101 | nea penic | NI | baOs : | Ta ₂ O ₃ | 150s./160s. 0d. per l. ton c.i.f. nom. |
| Lithium Ore- | | | | | | | | |
| Petalite min. 31 % LiaO | | | | | | ** | | 50s. 0d./55s. 0d. per unit f.o.b. Beira |
| Lepidolite min. 31 % Li2O | | | | | | | | 76s. 0d./80s. 0d. per unit f.o.b. Beira |
| Amblygonite basis 7% Lig | 0 | | | | | | | 75s. Od./85s. Od. per ton f.o.b. Beira |
| Magnesite, ground calcined | | | | | | | | £28 0s./£30 0s. d/d |
| Magnesite Raw (gro d) | | | | | | | | £21 0s./£23 0s. d/d |
| Manganese Ore Indian— | | | | | | | | |
| Europe (46 %-48 %) basis (| son od | freight | | | | | | 73d./75d c.i.f. nom. |
| Manganese Ore (43 %-45 %) | JO4. 04 | | | | | | | 69d /71d. c.i.f. nom. |
| Manganese Ore (38 %-40 %) | | | | | | | | nom. |
| | | | | | * * | | | 10s. 0d. per lb. (f.o.b.) |
| Molybdenite (85%) basis | ** | | | | | * * | | 10s. ou. per 10. (1.0.0.) |
| Titanium Ore— | mo . | | 4-15 | · | | | | £30/£31 per ton c.i.f. |
| Rutile Australian 95/97% | HO, (| prompt | deti | very) | * * | * * | | |
| Ilmenite Malayan 50/52% | TIO2 | ** | | * * | | * * | 9.5 | £11 10s per ton c i.f. |
| Ilmenite Travancore 58/60 | % Tio | 9 | | | * * | * * | | £15/£15 10s. per ton c.i.f. |
| Wolfram and Scheelite (65% | C | | | | | | | 106s. 0d./110s. 0d. per unit c.i.f. |
| Vanadium- | ., | | | | | | | |
| | | | | | | | | 7s. 6d./8s per lb. V ₂ O ₆ c.i.f. |
| Zircon Sand (Australian) 66- | | rO. | | | | | | £16/£16 10s, ton c.i.f. |
| witton pane (Ameranan) oo- | /9 E | 4 | | | - 0 | | | |

to 13,000 tons in July from 16,200 tons in June.

On Thursday the Eastern price was equivalent to £974\{\frac{1}{2}} per ton c.i.f. Europe.

LEAD-ZINC PRICES DECLINE

The lead and zinc markets are still under the influence of the disappointing results of the Geneva Conference and the prices of both metals have fallen. In the case of lead the contango has shown signs of narrowing, whilst in the case of zinc it has shown signs of increasing. Stocks of both metals showed a slight decrease at the end of last week, lead stocks now standing at 10,425 tons, a decline of 759 tons, whilst the zinc figure is 10,594 tons, a decline of 193 tons.

The lead market is deriving a little steadying influence from the continuation of the Mount Isa strike, which must soon be reflected in a smaller tonnage of bullion arriving in the United Kingdom for refining. The U.K. consumption figures for September show a considerable increase over the August figure at 31,359 tons, but the nine months total of 273,608 tons was 3 per cent less than the corresponding period of 1960.

In the U.S., the latest figures indicate that in August output of refined lead showed an increase of 16 per cent over the whole year, whilst refinery stocks fell by 2,600 tons owing to heavy shipments which totalled 37,500 tons. Lead consumption was estimated at 90,100 tons which was the highest for a year. The U.S. Bureau of Mines indicate that the January/September total of production of recoverable lead from U.S. mines amounted to 197,400 tons, which was 4 per cent above the same period of 1960.

There have been no new statistics in respect of zinc either in the U.S. or the U.K., but it is generally felt that consumption is rising in the former area, whilst in the latter area and in Europe there is still signs of a recession. The availability of Russian zinc is still a dominant feature in the market and it seems that the tonnages available more than off-set any decrease in production in Belgium and Germany due to increasing difficulties in obtaining raw materials.

OFFICIAL TURNOVERS

Official turnovers (in l.tons) for the week ending November 3, 1961, with the previous week's figures in parentheses, are:—

| Copper | 13,400 | (13.125) |
|--------|------------|----------|
| Tin | 2,580 | (2.060) |
| Lead | 9,100 | (11.025) |
| Zinc | 4,925 | (5,825) |

Closing prices are as follows:-

| | | nher 2 Sellers | November 9 Buyers Sellers | | |
|--|----------------------|---------------------|------------------------------|---------------------|--|
| Copper Cash Three months Settlemenf | £228} £229} £2 | £229 £229½ 29 | £2314 £232 £23 | £2321 | |
| LEAD Current 1 month Three months | £62 £62} | £62‡ £62‡ | £60‡ £61 | £604 | |
| TIN Cash | £979 £974} | £980 £975 980 | £972 | £973 £973 73½ | |
| ZINC Current ½ month Three months | £711 £721 | £711 £721 | £681 £694 | £68 | |

Mining Finance

That Capital Gains Tax

Although no specific mention of the capital gains tax was made in the Queen's speech at the opening of Parliament it now seems almost certain that some form of taxation on capital gains will be introduced in the near future. The real motives of the government in introducing this Bill are hardly relevant but it seems widely accepted that it is not primarily to raise additional revenue. As this is the case it is most essential that the bill should not affect the normal pattern of private investment.

A tax on capital gains is bound to detract to a certain extent from the attraction of investment in new enterprises particularly in mining where normal dividend income is often delayed for up to five or more years and therefore in the early stages capital growth is the main attraction. By the very speculative nature of the investment, new mining capital is always bound to be expensive but any legislation which increases the cost must do a disservice, partly to the industry, but more important, to British overseas investment as a whole.

Already overseas mining interests are turning to centres other than London for new capital and if Britain is to retain her place in the development of the overseas mining industry, and in turn in the development of newly emergent countries, then it is essential that as few barriers as possible are placed in the way. The various double taxation agreements that have been concluded with foreign

countries and the unilateral relief granted in respect of Commonwealth countries have been substantial factors in encouraging British investment in overseas developments; up to a point a capital gains tax could serve to nullify the value of these reliefs.

The additional cost of new capital is one aspect of the capital gains tax. The other concerns the application of the tax. Traditionally, the mining section of the market has always seen the widest fluctuations. This is due to the close dependence of most mining operations upon the commodity markets.

Over the past decade the margin between the high and low price with most shares in the industrial section has never been very great. On average over the whole period the low price is normally 75 to 85 per cent of the high for any one year. This is also true of the insurance and consumer goods sections. In the mining sections, however, the margins are much wider. In both tin and coppet the year's low is normally about 50 per cent of the high, and in zinc, though a little more stable, the percentage is only about 60. Considerations of the margins over a period of years can often be invalidated by a major change in the company's business but in selected cases, where this is not so, the difference between the mining and non-mining sections is even more marked. The low/high percentage in the mining section over three years is often as low as 35 com-

London Market Highlights

Business in South African gold shares was still rather limited this week, but the undertone of the market remained firm. Interest was mostly focused on the far west Rand group of companies, Hartebeest were particularly outstanding with an advance of 4s. to 47s. in three days; the move stemmed from the recent encouraging annual report coupled with hopes that the current dividend rate may be maintained despite the capital spending programme. In recognition of their holding in this Klerksdorp mine New Pioneer rose 9d. to 29s. 9d. Other firm spots included Buffels at 34s. 9d. and Vaal Reefs at 40s. 7½d., both stocks showing gains of 1s. 9d. A rise of 2s. 3d. to 35s. 9d. in Western Deep "A" stemmed from Johannesburg hopes of an early start to production.

O.F.S. issues showed little movement, but the older dividend-payers again attracted a modest amount of enquiry although the persistent shortage of stock here made dealing conditions difficult. In the finance group "Johnnies" (47s. 6d.) continued to benefit from the recent annual report with its strong balance sheet and Union Corporation moved up 1s. to 54s. 6d.)

The bomb incidents in Accra unsettled the market in Ghanaian shares, but prices rallied later when it was learned that the Queen's visit was not to be cancelled. "Casts", after falling 1s. to 15s., subsequently recovered to 15s. 6d. and Ashanti were finally unchanged at 10s. 1½d. after having weakened to 9s. 4½d.

Tins made a buoyant start to the week, market sentiment being given a boost by the unquestionably excellent results from Southern Malayan, the shares of which spurted 2s. 6d. to 35s. Ayer Hitam advanced 3s. to 46s.—their results for a similar financial period are pending—and gains of 1s. 6d. were seen in Sungei Besi at 44s. and Gopeng at 44s. 6d. On the following days, however, buying interest waned but there was little reaction in share prices. The only dull spots were provided by Malayan Tin Dredging and Amalgamated Tin of Nigeria. The former reacted 1s. to 30s. after the reduced final dividend, a cut which many had hoped would have been avoided despite the fall in earnings. Amalgamated's setback of 1s. 3d. to 10s. 1½d. followed the report with its news of a 5-year capital replacement programme which must limit dividends to some extent.

The copper group remained very firm in quiet trading for most of the time. Messina hardened to 13s. 9d. on the good September quarter output figures and Rhoanglo improved to 55s. 3d. A demand for the Rhodesian non-copper concerns raised Falcon by 1s. to their best this year of 10s. 6d. and caused Willoughby's to harden 6d. to 7s. 6d. Much less happy conditions obtained in the lead-zinc group. Already depressed by the low metal prices, share values weakened further following the sharp reductions in the interim payments from Consolidated Zinc and New Broken Hill. Shares of the former dropped 4s. 9d. to 55s., the latter came back 2s. 6d. to 38s. 9d.

pared with about 65 per cent in the non-mining.

These wide fluctuations in the mining markets mean that a net loss in any one year cannot be regarded as exceptional and therefore if this factor is to be recognized in the taxation of capital gains it is essential that either gains may be off-set against losses over a period of several years; or alternatively a claim against the inland revenue must be allowed at the standard tax rate whenever a net loss is incurred.

SATMAR-A CUSTOM REFINERY

As Mr. S. G. Menell mentioned in his review last year, Satmar's torbanite deposits have been exhausted and although extensive searches for alternatives have been made it has been decided, in the absence of any new discoveries, to change the nature of Satmar's business.

The company's refinery at Boksburg is to become a custom refinery, refining crude oil on behalf of the five major oil companies operating in South Africa. This will mean that the Boksburg refinery will continue to operate as an economic entity despite the exhaustion of the indigenous torbanite deposits. These arrangements have been entered with the full blessing of the government and, in fact, it is as a result of the company's representations that the five major oil companies were informed by the government that it considered the continued operation of the refinery to be in the national interest.

There are four major points in the agreements between the oil companies and Satmar. The agreement, which came into force on July 1, 1961, will continue for an indefinite period and is subject to at least five years notice from either side; the agreement should not, however, be terminated for at least 15 years. In order that the refinery can maintain the agreed quality and yield pattern it will be necessary to make certain modifications and improvements, this will cost Satmar approximately R900,000. Satmar will receive a net income of 10 per cent on its invested capital after providing for depreciation and taxation. Satmar is free to enter any other business, though if in so doing it uses its refinery plant then the net income from the oil companies will be renegotiated.

From the point of view of Satmar shareholders this must be regarded as a most satisfactory development following the cessation of the mining operations of the company.

Although a proportion of the company's current assets will be required for the capital expenditure on the refinery a balance of R958,790 is left after adjusting for tax provisions and sundry creditors. From this sum the directors propose to make a capital repayment of 25 cents per 50 cents share and to pay a dividend of 7.5 cents per share. It is also proposed to make a scrip issue of one 25 cent share for every 25 cent share then held and to then consolidate these bonus shares such that the issued capital of the company will be restored to its present level of 2,773,750 shares of 50 cents each.

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Looking to the future, it has been estimated that it should be possible to pay an annual dividend of at least 5 cents, which after deducting the tax-free capital repayment from the recent London price of 7s. 6d. means that the shares will yield 10 per cent gross.

REVALUATION OF GOLD

Pressure to get international agreement to the revaluation of gold to increase international liquidity was urged by Mr. Paul Chambers, chairman of I.C.I. at the annual conference of the Institute of Directors held in London this week. This was one of the nine points of a plan he outlined to tackle the problems facing British industry.

"A revaluation of gold," he said "would not involve the devaluation of sterling in relation to American dollars, but would be designed to increase the value of existing reserves throughout the

world. Perhaps our American friends will come round to this way of thinking soon."

By voicing his views at this juncture Mr. Chambers tends to underline growing suspicion in Europe and elsewhere since the I.M.F. Vienna Conference that Dr. Per Jacobsson's plan to increase the Fund's paper resources can be no more than a temporary expedient to deal with, say, a run on one of the major convertible currencies, and that a longer term solution to the international liquidity problem must be found soon.

TIN BOOM REFLECTED AT PERAK RIVER

As a result of the lifting of the restrictions upon tin exports in October, 1960, the tin industry in Malaya has considerably increased its output and this has been reflected in the results of Perak River Hydro-Electric Power.

The gross revenue has increased by some 22.5 per cent to £1,841,037 and has established a new record. Demand for electricity in the company's concession area has increased during the year and the distribution system is now fully loaded. Earlier, it was anticipated that it would be possible to obtain additional power from the Central Board but as the demands on this Central system have also increased this is no longer possible, certainly for several years to come.

It has, therefore, been decided to instal two additional 20mW generating sets at the Malim Nawar power station. At present the company's net liquid assets amount to £1,018,139 and thus it is in a strong position for financing the cost of the further generating plant at Malim Nawar.

BRITISH ALUMINIUM HAS FAITH IN THE FUTURE

In common with most other aluminium companies the consolidated profit for British Aluminium has shown a considerable drop. The profit for the year before taxation has fallen from £4,099,963 to £2,847,829. Lord Plowden has said that this is generally due to the reduction in demand for semi-fabricated products in the U.K. and to the weakening of prices in certain export markets. The poor water conditions at British Aluminium's Highland reduction works was also a particular factor which contributed to the fall in profit.

In the immediate future it seems unlikely that there will be any great improvement in profit levels, in most overseas countries the aluminium prices are still weak reflecting the widespread oversupply position. However, in the more distant future potential demand for the metal presents an encouraging picture. The company is well placed with its widespread interests overseas to meet this demand when it materializes.

The Canadian/British Aluminium Company has decently announced plans for further expansion at its Baie Comeau smelter, described here on August 11, 1961, and in the annual accounts it is shown that this company has now made its first trading profit. The financing of this expansion, estimated to cost \$36,000,000, should not involve a large cash flow from British Aluminium itself.

Confidence in the aluminium industry, and in British Aluminium in particular,

can be seen in the two unsecured Swiss loans raised during the year. These loans amounting to over £9,000,000 have provided part of the funds necessary for the company's expansion programmes, both at home and overseas.

Following the dissolution of British Aluminium's joint association with Consolidated Zinc in Comalco, discussed on September 23, the company is now going ahead with the development of the Gove bauxite deposit. During the year some £84,660 has been spent on the development of this project.

In Norway plans are now under preparation for the development of further hydro-electric power whilst in India work has started on the modernization and expansion of the foundry and manufacturing capacity. The associated Chinese company is now in the process of liquidation, satisfactory terms having been obtained from the People's Government.

TECHNICAL IMPROVEMENTS AT

The report and accounts for Beralt Tin and Wolfram were discussed here on September 1; the profit for the year, after Portuguese taxation, being £241,067 which is £28,203 higher than the previous year.

Production of wolfram has increased by just over 10 per cent to 2,079 tons whilst the production of tin has fallen from 241 tons to 53 tons. As can be seen from the accounts the increase in wolfram produced more than off-set the lower production of tin due to the suspension of operations at Vale da Ermida. At the other large low-grade tin deposit of Argimela progress during the past year has been disappointing. At present, mainly due to the strength of the tin market, a limited tonnage is being produced from this property but there is still insufficient evidence to show that a large scale operation could be economic.

In this context, it is disappointing that the I.T.C. were unable to reach agreement on new floor prices, for this must be very important in any consideration of the potentiality of this deposit particularly as the initial capital would be high and a stable tin price would be essential.

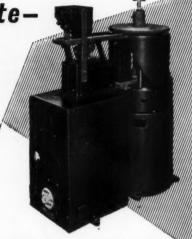
In his annual review of operations, extracts of which are published on page 499, Sir Christopher Ll. Bullock has referred in detail to the wolfram marke' The average price for 1960/61 was 148/10 compared with the present price of only 118/-. The full implications of this are discussed on page 491, here it is sufficient to say that such a low price leave little margin for profit on most mines and it is particularly difficult for low-grade operators. Beralt, itself a low-

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SIEBEMAN

Siebe, Gorman & Co. Ltd., Neptune Works, Davis Road Chessington, Surrey Telephone: Elmbridge 5900 Branch Offices at: Birmingham, Glasgow, Manchester A Member of The Fairey Group of Companies grade mine, now finds itself in the position of having a falling revenue per unit on the one hand, and continually rising costs on the other. Unless there is a substantial improvement in the price of wolfram the current year's profits cannot be at the same level as the year under review.

In order to combat the general problem of labour shortage and also of rising labour costs Beralt are hoping to eliminate manually operated stopes completely. During the year five electric scraper units have been installed bringing the total to ten and a further five are due to be delivered shortly.

An interesting development is the new technique of measuring the mineralised area in the stope face and thus obtaining an estimate of the stope values. At present this technique is in the experimental stage but if experience confirms its reliability then it should make a valuable contribution to grade control.

Diamond drilling has indicated a large area of new reserve to the west and south-west of the mine. This new area will require a considerable expenditure in terms of development but it is planned to spread this work over the next few years.

During the past year development at the mine has been accelerated, particularly in the preparation of the southwest section of the mine, and the board has decided that development will have to be maintained at a higher rate than in the past.

PADLEY AND VENABLES RAISING EXTRA CASH

It has been announced that Padley and Venables have made a conditional agreement to purchase the capital of Production Tool Alloy Ltd. for £350,000. Half of the payment is to be in cash and the balance by the allotment of some 583,333 shares. P.T.A. have been the sole suppliers of tungsten carbide to Padley and Venables for some years.

It is also proposed to raise £209,440 by a rights issue of one-for-three at 4s. for the 2s. shares, and a further £150,000 by an issue of debenture stock. The directors are of the opinion that with this additional cash and having regard to the bank facilities the group will have adequate finance.

As part of the re-organisation with the inclusion of P.T.A. in the group it is proposed to form two separate operating companies, one to specialise in mining and engineering whilst the other will conduct the stainless steel business.

NEWMONT MINING'S NEW VENTURES

Speaking in New York Mr. Malozemonf, Newmont's president, said that new ventures account for some 46 per cent of Newmont's total assets. Amongst these new ventures, which are expected to considerably boost the company's future earnings, are the Newmont Oil Co., Southern Peru Copper Corp. and the Palabora Mining Company. The two copper producers are not expected to show profits for several years yet but the wholly owned subsidiary Newmont Oil should show a profit of about \$1,000,000 for the first time this year. Newmont has 104 per cent interest in Southern Peru Copper and will have an eventual interest of 30 per cent in Palabora.

Palabora is managed by a subsidiary of Rio Tinto and has an orebody of some 350,000,000 tons of 0.7 per cent copper, most of which appears to be proved. It will be worked as an open-cast proposition with an unusually low stripping ratio and may have an annual production rate of between 60,000 and 70,000 tons of copper.

The market value of Newmont's quoted investments currently stands at \$196,000,000. This excludes most of its new interests and its 29 per cent holding in Tsumeb, this investment alone could be valued at a further \$22,000,000. In terms of net income the investments are spread as: copper lead and zinc, 65 per cent; oil and gas, 22 per cent; nickel and asbestos, 4 per cent; uranium and others 9 per cent.

Compared with the previous year earnings from investments are expected to be a little down in 1961 but the president is confident that capital gains should offset this decrease. During the first six months of the year the earnings were \$6,801,181 equal to \$2.41 per capital share compared with \$6,780,121 for the same period of 1960. The earnings for the full year should be equivalent to \$4.36 per share.

GOLD FIELDS DIVIDEND MAINTAINED

With their preliminary statement of accounts Consolidated Gold Fields have recommended a maintained final dividend of 3s. 9d. per share. This is on the increased capital as a result of the one-forten scrip issue last December and is, therefore, an increased total dividend payment of some £158,000.

The net profits for the year have increased by some 26 per cent to £4,031,585, the greatest increase being in the item "Dividends and Interest received". Another substantial increase has been in the net revenue received from industrial companies and mining operations, the increase in this sector, whilst not directly the largest, is most significant for its percentage growth, from £915,742 to £1,357,541 or about 48 per cent. In looking to the future, it is most significant that this overall increase in profits has been possible despite the fact that the profit from the realization of investments has remained almost constant.

Whilst Gold Fields is still very mucn a South African mining house one of the features of the past year has been its diversification, not only into other industries but also into other countries of the world. Gold Fields has substantial interests in America, Canada, Britain and, particularly recently, in Australia. Reported below is the offer to purchase the capital of Z.R. Holdings, an Australian rutile producer.

GOLD FIELDS BIDS FOR Z.R. HOLDINGS

Associated Minerals Consolidated, a recently acquired subsidiary of Gold Fields, Australia, has made a bid for the share capital of Z.R. Holdings. The offer for this rutile and zircon producer consists of A8s cash for each share plus one Associated Minerals share for every three Z.R. Holdings shares. This offer comes about a month after the announcement of a forthcoming offer by National Mineral Holdings for the Z.R. Holdings shares. The terms of this offer are A5s. cash for each share plus two shares in National Mineral Holdings for each three shares in Z.R. Holdings.

It has been agreed that should the offer of the Gold Fields subsidiary be successful then Consolidated Gold Fields (Australia) will have the right to subscribe for additional shares in Associated Minerals Consolidated in order to maintain its interest at not less than 50 per cent. At present Gold Fields hold 66 per cent of this company, which is also a rutile producer.

FRESNILLO DIVIDEND

The Mexicanization of the operations of the Fresnillo company is now complete and the dividend of 10 cents per share which has recently been paid is free of Mexican dividend tax: During the past year the company has in fact made a net loss but the directors feel that the continuance of the dividend payment is justified by the prospect of future earnings.

In his annual statement the chairman has said that the reduction in taxation, following the Mexicanization will not be felt until after January 1, 1962 and therefore a loss may also be made in the first half of the company's current financial year. However, after that time, there should be a substantial improvement in the operating profits and this should be continued into the coming financial year.

This revenue from mining operations will be supported by the revenue from the investment of the proceeds of the sale, as a result of Mexicanization of 51 per cent of the company's properties. As yet no decision has been made as to how best to invest these funds but the directors believe that it should be possible to substantially increase the return to shareholders as time goes by.

Zinc Corporation.—A bill has been introduced into the Victoria State Legislature to permit the transfer of Zinc Corporation from the United Kingdom to Victoria, Australia. Zinc Corporation is a wholly owned subsidiary of Consolidated Zinc.

Ipoh Tin.—Operations for the first six months of the current financial year have shown a loss of approximately £20,000. The new board, led by Mr. Barney Pike, are therefore taking steps to cease mining operations and to dispose of the company's assets in Malaya.

Mazapil Copper.—A group loss has been incurred by the Mazapil Copper Co. for the third year in succession. After taking account of the lower subsidy from the Mexican government the net loss is £125,574 compared with £29,700 for the previous year.

Broken Hill South.—Subject to the agreement of the New South Wales Minister for Mines, the British-Junction section of the North Broken Hill mine is to be transferred to Broken Hill South. The consideration for the sale of the leases will be 450,000 shares in Broken Hill South. These shares will not carry rights to the proposed new cash issue.

St. Joseph Lead.—The earnings for the first nine months of 1961 have been considerably improved by comparison with the previous year, partly due to the sale of the company's interest in Brunswick Mining and Smelting. The dividend earnings for the period are \$1.73 per share compared with \$0.77 for the first nine months of 1960.

(Continued on page 500)

SOUTH AFRICAN TORBANITE MINING AND REFINING COMPANY LIMITED

(Incorporated in the Republic of South Africa)

CONTINUED OPERATION OF BOKSBURG REFINERY ASSURED

MR. S. G. MENELL ON THE NEW ARRANGEMENTS

The 27th annual general meeting of South African Torbanite Mining and Refining Company Limited will be held on December 1, in Johannesburg.

The following is the circulated review of the financial year to June 30, 1961, of the chairman, Mr. S. G. Menell:

The Directors' Report gives the results for the past financial year so that I need not elaborate on them in this review, except to mention that the termination of the normal trading of your company has brought about certain adjustments which are set out in the Report. It has only been necessary to set aside the sum of R73,080 for depreciation of fixed assets, which is approximately R150,000 less than in 1960. Furthermore, it has been possible to bring back into profit, depreciation recouped amounting to approximately R275,000 consequent upon the sale of portion of Satmar's assets which was effected in the year under review. These amounts, totalling approximately R425,000, have enhanced Satmar's profits for the year under review as compared with the corresponding profits for 1960. In view of Satmar's future, as explained in detail below, a substantial sum

In view of Satmar's future, as explained in detail below, a substantial sum of cash will now become surplus to Satmar's requirements and available for repayment to members. In these circumstances, it was in members' interests for the directors to recommend, as they have done, that the dividend should not be increased over last year, so that the company's cash resources could be made available to the maximum extent for the repayment of capital to members.

Board's Policy Explained

It has not been possible in recent years for your directors to disclose to members certain aspects of Satmar's business and intended future owing to the fact that negotiations were in progress of a confidential nature which would have been prejudiced by premature disclosure. Briefly the position has been as follows:

Satmar's torbanite deposits were becoming exhausted and extensive searches for alternatives were being made. At the same time and against the possibility that such alternative deposits would not be found (as has in fact proved to be the case) ways and means of keeping the Boksburg refinery in being were investigated. Throughout this period these factors influenced your directors' recommendations on financial policy including particularly that of keeping cash resources available for use on short notice. These resources were unusually inflated because, in view of the uncertainty of the refinery's future, your directors kept expenditure on it to a minimum.

We were unsuccessful in our search for commercially exploitable torbanite deposits and as a result of our detailed investigations it also became apparent that we could not follow the costly and precarious course of independent competitive refining and marketing. It was as a result of our representations to Government that the five major Oil Companies operating in South Africa, namely B.P. Southern Africa (Pty.) Ltd.; Caltex (Africa) (Pty.) Ltd.; Shell South Africa (Pty.) Ltd.; Total Oil Products (Pty.) Ltd.; and Vacuum Oil Company of South Africa (Pty.) Ltd., ("the Oil Companies") were informed that the Government deemed it in the best interests of the national economy that the Boksburg refinery should continue to function as an economic entity by receiving and processing crude oil after the exhaustion of its indigenous torbanite deposits.

Effect of New Arrangements

You will be gratified to learn that following on negotiations on these lines agreements have now been signed between Satmar and each of the above Oil Companies whereby each Oil Company will furnish Satmar a share of the crude oil required for the operation of its Boksburg refinery, will distribute a share of the resulting products, and compensate Satmar on a basis sufficient to permit the continued operation of its refinery at a reasonable profit.

We are grateful to the Government for assistance in this matter and would also pay tribute to the heads of the Oil Companies concerned in that, the principle once accepted, they made every endeavour to translate the request into practice. The rather protracted negotiations, largely because of the complications arising in dealing with several parties, were conducted throughout in a most amicable manner, and it is in such spirit that all concerned are working to ensure the success of the venture.

Needless to say the agreements, which are somewhat complicated and lengthy, contain many technical matters which I do not propose to summarise, particularly as the agreements are, as stated below, available for inspection by members. However, for the convenience of members the following are the more important provisions and their effects on Satmar:

The agreements, which came into opera-

The agreements, which came into operation as from July 1, 1961, will continue for an indefinite period subject to at least five years' notice of termination. This notice may be given by either Satmar or the Oil Companies at any time but shall not end before June 30, 1976. The agreements are therefore for a period of at least fifteen years.

The Oil Companies will supply Satmar with crude oil of specified quality at the coast, which will be railed to the refinery at Boksburg East for refining into specified petroleum products. The crude oil and products will remain the property of the Oil Companies throughout. Satmar, on its part, undertakes to refine 25.5 milion gallons of the crude oil per annum and to maintain its refinery and facilities in a satisfactory state of efficiency for this purpose.

Satmar will not be in a position to process the above-mentioned agreed quantity or produce the stipulated vield pattern or product quality until it has installed additional facilities at the refinery. It has therefore undertaken to install these as soon as possible. It will also now be necessary to catch up on the backlog of replacements and various improvements which, as I have indicated above, were purposely left in abeyance pending a decision as to the refinery's future. It is estimated that approximately R900,000 of Satmar's present cash resources will be required to complete the above replacements, improvements and additions, bringing the capital invested and employed to R1,886,000, which amount has been accepted by the parties as being required to enable Satmar to carry out its obligations in terms of the agreements, but may be increased by agreement between the

Subject to Satmar fulfilling its obligations it will receive a net income of 10% on the capital invested and employed in its refinery business, after providing for the depreciation of fixed assets at specified rates and after the deduction of income tax at the rate in force each year. There is provision for Satmar to earn a profit in excess of this figure if it is able to reduce its costs of operation materially.

The above arrangements can be terminated by the Oil Companies in the event of the economics of the refining of imported crude oil at Satmar's refinery being vitally affected by either a decrease in the differential between the cost of moving crude oil and the cost of moving refined products from the coast to the refinery, or by any change in national, provincial or municipal legislation, or for a breach of agreement by Satmar.

Satmar will be relieved of normal trading commitments and risks and the necessity of having considerable finance locked up in stocks of raw materials, manufactured stocks and trade debtors.

Satmar is free to enter any other business or invest its surplus funds in any other business provided that if it uses any of its refinery plant for such business the net income receivable from the Oil Companies will have to be renegotiated.

Since Satmar will no longer be required to market its products, our sales department has been disbanded and our marketing arrangements with the Sasol Marketing Co. Ltd. ("Sasol") have been terminated from June 30, 1961. The arrangements for the purchase of alcohol and benzol supplies from National Chemical Products Ltd. and South African Iron and Steel Industrial Corporation Ltd. have also been discontinued and transferred to Sasol. I would like to express Satmar's appreciation to these three companies for their cooperation over the years and in particular in connection with the changeover to the new arrangements.

While the profits from the new arrangements will not be as high as those earned from trading during the past two years, it must be remembered that during this period while negotiations were in progress, we have had the benefit of the co-operation of the Oil Companies in granting, through Sasol, an outlet for all our petrol production, a facility granted initially for petrol produced from indigenous sources.

On the information at present available to them your directors estimate that the arrangements should make it possible to maintain a dividend of at least 10% or 5 cents per 50 cent share per annum on the basis of the present issued share capital (which will remain the same after the reorganisation recommended below) provided that the processing of crude oil proceeds as smoothly as at present contemplated.

Capital Reconstruction

Now that the future of Satmar has been decided, its surplus cash can be released to members.

For the convenience of members the following tabulation sets out the position and your directors' recommendations:

| ions: | |
|---|-----------------------|
| Cash on hand as at June 30, 1961 It Less tax provisions | R1,779,754 370,000 |
| _ | 1,409,754 |
| able from debtors outstanding at June 30, 1961 | 844,449 |
| _ | 2,254,203 |
| Less creditors as at June 30, 1961 | 395,413 |
| | 1,858,790 |
| Less estimated capital expenditure required | 900,000 |
| Leaving a balance of | 958,790 |
| Less Dividend No. 20 of 7.5 cents per share Proposed repayment of capital (25 cents | |
| per 50 cent share) 693,438 | 901,469 |
| Leaving a balance of | R57,321 |

As members will see the above proposals involve the reduction of Satmar's issued capital from R1.386,875 divided into 2,773,750 shares of 50 cents each, to R693,437.50 by repaying to members an amount of 25 cents per share.

In the Notice of the Annual General Meeting of the Saturd Saturd

In the Notice of the Annual General Meeting the necessary special resolution is included and, if it is passed, application will be made to Court to confirm the reduction.

Your directors further recommend that, after the reduction, R693,437.50 of Satmar's reserves, which will no longer be required, should be capitalised by the issue to members of one bonus share of 25 cents for every share then held. These bonus shares of 25 cents will be immediately consolidated with every reduced 25 cent share held, thus restoring the issued capital to its present level of 2,773,750 ordinary shares of 50 cents each. Each member will ultimately therefore have the same shareholding as how has, but having received 25 cents per share by way of capital repayment.

Notice of the special resolutions to implement these proposals is also included in the Notice of the Annual General Meeting.

A special resolution for the adoption of new Articles of Association is also to be proposed at the Annual General Meeting. This matter is fully explained in the Directors' Report so that I do not propose to comment further on it here.

The transfer books and register of members will be closed from November 25 to December 1, 1%1, both days inclusive, for the purpose of ascertaining those members entitled to attend the Annual General Meeting.

In the event of the Court approving the reduction of capital, a further formal notice will be given as to the closing of the books for the repayment of capital.

When the register of members and transfer books of Satmar have been closed on November 25, 1961. Satmar will make application to the Exchange Control authorities of the Republic of South Africa for permission to remit capital repayments to those members who appear as non-resident on the register of members at that date. Application cannot be made by the company in respect of non-resident members whose shares are registered in the names of nominees with addresses within the Republic of South Africa, and the attention of such non-resident members is directed to this.

Copies of the agreements with the Oil Companies and drafts of the proposed new Articles of Association may be inspected at the company's offices in Johannesburg and London at any time during usual business hours prior to the meeting.

Tribute to Employees

It gives me great pleasure to express to all employees of your company our appreciation of their efforts which have vielded such excellent results. In particular I would like to take this opportunity of recording a special word of thanks to Mr. W. B. Somerville, who was Managing Director of the company during the past eight years, and to our sales staff to whom much credit is due for their achievements over the past years and whom I am happy to say have all been established elsewhere.

BERALT TIN AND WOLFRAM

SIR CHRISTOPHER BULLOCK'S* REVIEW OF THE WOLFRAM MARKET

The thirty-third annual general meeting of Beralt Tin and Wolfram, Limited, was held on November 2, in London.

Sir Christopher Ll. Bullock, K.C.B., C.B.E., Chairman, presided, and in the course of his speech said:—

Improvements in Mining Techniques

We continue to devote much attention to improvements in mining technique and to further mechanisation underground. This is a more complex undertaking than with many mines, owing to the irregular nature of our deposit. As illustrating this irregularity, you may be interested to know that in a single stope face which has given an average yield of 33 kilogrammes of mineral per square metre, as much as 27% of its length has carried less than 10 kilogrammes. Stretches of face containing less than 5 kilogrammes may immediately adjoin stretches carrying 20 kilogammes or more. Nor are these stretches of weak mineralisation continuous; they often occur erratically throughout a stope. I should like at this point to express my appreciation of the useful work which has been, and is being, done in this field both by our Manager in Portugal (Mr. G. A. Smith) and our Consulting Engineer (Mr. J. C. Allan). This work is of the utmost importance in order that coefe man he portance, in order that costs may be held down so far as possible. For in Portugal, as in this country, costs—and in particular labour costs—have been rising; and, with a sluggish and depressed wolfram market, this trend is one of our main current problems.

So far as mechanisation is concerned, further progress has been made: for example, the five electrically driven scraper units previously installed were supplemented early in 1961 by an additional five, and five further such units will shortly be delivered to the Mine—bringing the total to fifteen. We hope eventually to eliminate manually operated stopes altogether, which should secure an appreciable saving of manpower.

We are also in process of applying a new technique for estimating the mineral values in stopes by measurement of the mineralised area in the face. Whilst this technique must still be regarded as experimental, it has given quite promising results to date; and values estimated by this method are showing a close relationship with actual production, after application of a factor for normal mining and milling losses. If further experience confirms its reliability, it should enable the Mine management to eliminate unpayable stopes with greater confidence than in the past. It should also facilitate closer grade control, the exercise of which is important when dealing with a product subject to such severe price fluctuations as have unfortunately always characterised the wolfram market.

Wolfram Market

The market for wolfram has been in a sluggish and depressed condition for some time past. After a period of reasonable stability at between 150/- and 160/-per long ton unit during the first nine months of the year under review, the price fell to 120/6 as at March 31, 1961. It then showed a small recovery and in June rose to 130/6; but during the past two months it has declined again and

stood at the end of October at no more than 118/-. In recent years there has normally been a considerable seasonal demand for wolfram in or about September; this year there has been virtually none.

Various factors have contributed to these price fluctuations and the present weakness of the market. Among them have been sales from behind the Iron Curtain, primarily of concentrates of Russian or Chinese origin, which have been sold on occasion at very substantial discounts. Demand for wolfram from the Continent, particularly from Germany and Austria, has been largely satisfied for some time past by supplies from these sources under running contracts.

Another disturbing factor has been the availability of Government surplus stocks in this country. I am glad to say that there has been to date no repetition of the serious price debacles of 1957 and 1959, caused by these stocks being 1959, caused by these stocks being pressed on a market in no condition to absorb them. But it is obvious that the knowledge that they are awaiting sale has had, and must continue to have, an adverse influence. In my opinion, but for sales from this source, the price might well have risen to a more reasonable level when intermittent bursts of demand have occurred in the past 12 months. Though it is only fair to say that those concerned have made every effort to avoid disruption of the market, I consider the Authorities should bring this whole question under careful review. I doubt whether it is to the tax-payers' advantage that these stocks should continue to be liquidated at what must be a very heavy loss on their original purchase price. Moreover, I regard continuations ance of the present state of affairs as unfair to producers in today's difficult conditions. The Authorities might well fix and announce a *minimum* price below which they will not sell; or a scheme might be devised on the lines of the Rubber disposal scheme whereby, within a prescribed price range, a 'tap' would be automatically turned on and off.

As to longer-term prospects, it is encouraging that very large sums continue to be spent in the United States on research and experiment in the field of tungsten and its products. A recent report speaks of tungsten as one of four metals which are regarded as the most promising for rockets and similar missiles, whether for Space exploration or for military purposes, and states that over \$20,000,000 is being spent on research into these metals in the current year. Several interesting developments, for example in fabricating technique, have been reported as a result. If these prove capable of commercial application — and some of them have already done so — new uses may well emerge which will substantially enhance demand. And demand should in any case tend to increase over the years as world industrialisation develops and spreads into new countries. For what it is worth, the United States Materials Policy Commission estimated in 1952 that world consumption of tungsten might increase by 150% by 1975.

Before I close, I should like to express my appreciation of the services which continue to be rendered by Mr. G. A. Smith, who has been General Manager at the Mine for 27 years. I am sure you will wish me to convey our thanks to him, to Senhor Claudio dos Reis, our Chief Portuguese mining engineer and Director Tecnico, and also to the other members of our Staff in Portugal.

The report and accounts were adopted.

THE PERAK RIVER HYDRO-ELECTRIC POWER COMPANY

RECORD RESULTS ACHIEVED

The thirty-fifth annual general meeting of The Perak River Hydro-Electric Power Company, Limited was held on November 8 in London, Mr. Hugh G. Balfour (the Chairman) presiding said:

"Before dealing with the business of the Meeting, it is my sad task to refer to the death of our old friend and colleague, Mr. Stewart Kilpatrick, O.B.E., which occurred on Friday October 20 last.

Mr. Kilpatrick was not only our senior director in length of service—he joined the Board in 1926, the first year of the Company's existence and had served continuously ever since—but he was a shrewd and genial colleague whose financial acumen and sound business judgment were always willingly brought to bear on the various problems which from time to time confronted the Board.

As the senior partner of Messrs. Govett. Sons & Company, this Company's Brokers, he occupied a prominent position in the life of the City of London, where he will be much missed. I am sure that I speak for all who knew Mr. Kilpatrick when I say that we feel a deep sense of loss at his passing."

The following is an extract from the Chairman's circulated statement:—

The results for the Company's financial year ended July 31, 1961, continued to be satisfactory. Gross Revenue at £1,841,037 showed an increase of 22.5 per cent on the previous year and surpasses the previous record year, 1957, when the comparable figure was £1,683,155.

Generating plant continued to give good service during the year. Total units generated at just under 480 million showed an increase of 24.03 per cent on 1960. The Malim Nawar steam power station generated 243.37 million units, or 34.7 per cent more than the previous year, while the Batu Gajah steam power station generated 76.69 million units, or 118.08 per cent more than 1960. Unfortunately, the effective flow of the Perak River at the Chenderoh power station continues to be well below the average minimum flow for the last 31 years with the result that Chenderoh only generated 159.6 million units or 6.6 per cent less than last year. We should reasonably expect some 190 million units in a year of normal rainfall.

Installation of Further Generating Plant Proposed

During the year 89 miles of high tension transmission line were constructed and energised and 71 miles of line dismantled because of normal changes in mining operations. Demand for electricity in our Concession Area showed a marked increase during the year, with the result that the distribution system is now virtually fully loaded. I referred last year to the possibility of obtaining a bulk supply of electricity from the Central Electricity Board. It is now clear, however, that, owing to the increasing demands on the Board's system, such a supply cannot be expected for at least several years to come.

The Directors have therefore decided to proceed with the installation of two additional 20mW, generating sets and ancillary plant at the Malim Nawar power station, subject to the necessary consents of the Malayan Authorities.

Our subsidiary, The Kinta Electrical Distribution Company, Limited, had another satisfactory year and business continued to expand.

Turning to the Revenue Account for the Company, revenue from the sale of current and miscellaneous income at £1.841,037 shows an incease of £338,349 over the previous year and resumes the pre-restriction rate of growth. After various deductions, including provision for taxation, the profit for the year is £407,340 as against £295,051 last year. Your Directors recommend a final dividend of 6 per cent and a bonus of 5 per cent. Taken in conjunction with the interim dividend of 4 per cent already paid, this makes the distribution to the Ordinary Shareholders for the year 15 per cent. This distribution represents an actual rate of 3.2 per cent on the total capital employed in the Company's business.

The Company's Balance Sheet at July 31, 1961, shows that fixed assets have increased by £207,442 and that the excess of current assets over liabilities is £1,018,139 as compared with £720,992 in the previous year. It will, therefore, be seen that the Company is building up a strong liquid position against the cost of the further generating plant required at Malim Nawar.

The report and accounts were adopted.

MINING FINANCE—Continued

Pahang Consolidated.—A final dividend of 1s. 3d. bringing the total for the year to 1s. 9d. has been recommended. The profit for the year ended July 31, 1961 has increased by some 17 per cent to £395,550. The annual meeting will be held on December 14 in London.

Preston Offer extended.—Tinto Holdings have announced that their offer to purchase shares of Preston Mines is being extended to November 10, 1961. As at October 31, over 1,000,000 shares had been lodged in response to the offer.

New Kleinfontein.—Following the reduction of the company's capital from R3,470,000 to R1,735,000 the first capital repayment of 10 cents per share has been made. Under the authority of this court order a further 90 cents per share can be repayed. The par value of the shares is now R1

Falcon Quarterly.—The total profit at the mine during the quarter ended september 31, amounted to £53,581. The development advanced totalled 3,361 feet. Of this figure 2,275 feet were sampled and 36 per cent proved payable at 496 in.-dwt.

The Institution of Mining Engineers is arranging a Symposium on Transport at Mines in July 1965 and not in 1964 as we inadvertently reported in our issue of October 27, p. 422. This will take place concurrently with the next Mining Machinery Exhibition to be held in the Grand Hall, Olympia, London, for which arrangements have been concluded by the Council of Underground Machinery Manufacturers.

